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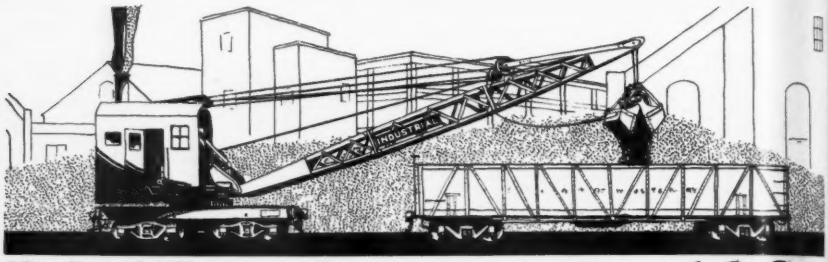

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Pit and Quarry

A Semi-Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

VOL. 9 CHICAGO, ILL., NOVEMBER 1, 1924 NO. 3

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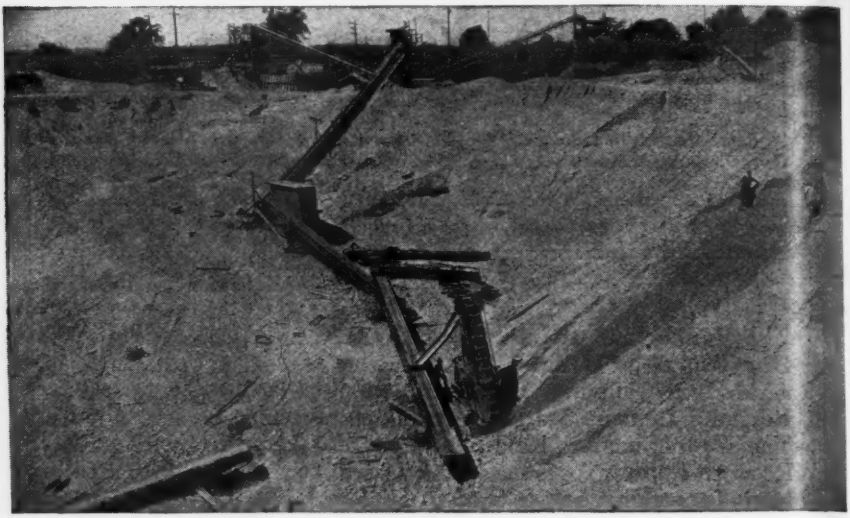

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Vol. 9 Chicago, Ill., November 1, 1924 No. 3

The Banker and the Business Cycle

THE importance and significance of the business cycle should be more widely understood. Inflation and deflation are symptoms of unsound business conditions and can be attributed to ignorance. An educated community becomes a self-controlled community. Panics are incompatible with intelligence and poise. The curve of the business cycle may be modified and controlled through the influence of the bankers. They have it within their power to contribute to the general education of the public.

The curve of the business cycle is in reality a graph showing the psychological status of the community. Human hopes and human fears are vital determining factors in the plotting of that curve. Selfishness, greed, fear, nervousness, ignorance are the elements which give impetus to a mad rush which resembles a stampeding herd crushing its own members under foot in its frenzy. When the terror is aroused, not much can be done to check it. The mission of the banker will be to forestall the event by such educative processes as will cause intelligence to dominate mass thinking.

There is in human beings an innate quality which urges them to struggle to attain what others are striving for. People will push and crowd each other in order to get on to a street car when there is another one following. Three or four minutes will not be consequential to them, but they want to do what others are doing, to get what they are getting. If a street vender can get three or four persons to purchase his article, many more will purchase because they saw others doing it. The same principle governs selling on the largest scale. The gregarious instinct carries humanity along with the herd. No one can stop them if they once start.

The herd instinct is a primal one and can be inhibited only through a long process of education. The banker can exert a very great and wholesome influence in restraining the unhealthy development of business. Through wise counsel he becomes a medium through which information reaches the public. The collection and distribution of economic data, information regarding the power and limitations of the dollar and all that it symbolizes, the distinction between wealth and money, the relation of production to consumption and to distribution,—these are matters of grave interest to a community. Widespread knowledge of such fundamental economic principles would serve to control the herd instinct. It is the banker's duty to accept the responsibility of such leadership and to instruct the public in matters pertaining to current business conditions.

The banker cannot perform miracles. He can only exert an influence, a powerful one, in restraining unhealthy expansion of business and thus flattening the curve of the business cycle. The banker is a credit merchant who deals in capital. He organizes it and offers it to those who can pay the market price in terms of yield and security. As a merchant the banker must meet the demands of his customers. The banker is also a trustee who guards the capital of a great number of people. He must safeguard their money in times of inflation and in times of deflation. He must satisfy his customers.

The responsibility of the banker is thus immeasurable. He is entrusted with the capital of the stockholders and with the capital of nearly every man and woman in the country. His power to influence the trend of thought of the community is a power to influence the curve of the business cycle.

Our Unstable Dollar

PRICES of commodities and cost of living vary according to the purchasing power of the dollar. Our dollar is unstable; the general level of prices is unstable. Records show that the history of money is one of change. The explanation of price changes is found in money, not in goods. A rise of prices does not indicate a scarcity of goods, but an abundance of money. Currency is measured in terms of commodities. That is its real purchasing power. Wherever there is inflation, wherever there is change in the quantity of money or substitutes for money, the purchasing power goes down or vice versa. When the mines of California flooded the market with gold in 1849, prices rose.

If it were true that when we pay twice as much for an object, we have twice as much money with which to pay, we would be just where we were at the start. If when we have a fifty-cent dollar, our incomes increase in proportion to the decrease in value of the dollar, there is no hardship. It is, of course, impossible that such a harmonious adjustment can be made. Contracts cannot be so arranged. The dollar is the standard for all business transactions and is considered an invariable unit. If it varies, it produces an injustice to someone. If prices rise and money depreciates, the debtor gains; if the opposite happens, the creditor gains.

This unstable condition of the dollar may prove hazardous through a long period of years. An individual with $100,000 in gold bonds in 1896, who has been cutting coupons for more than a quarter of a century, has in reality been using his capital. The $100,000 today is worth about a third of what it was worth in 1896. When prices are high, the bond holder becomes the creditor and the stockholder the debtor. When prices are falling, the bondholder gains.

The unstable dollar results in social discontent. The loss of purchasing power is hardest for the wage earner and the salaried man. When he finds that the rise in prices has been simultaneous with an increase of income. he feels that he has been tricked. Even though he seems to be profiting by unprecedented wages, he is in reality losing. He realizes this and is consequently dissatisfied.

The unstable dollar increases inefficiency in business and in the professions. When salaries are slow to adjust themselves to high prices, members of the group look elsewhere for occupations, and general efficiency is lowered. This is apparent and is the price we pay for an unstable dollar. The key to all efficiency is a stable unit. In industry, for example, we must have a stable unit of length, of weight, of measure. The yard stick has had to be stabilized; it was an uncertain unit in primitive times. The dollar is far more important because it is concerned with long period agreements and contracts. Dollars of today are exchanged for dollars of tomorrow.

We now have a method of measuring the purchasing power of a dollar, a method establishing an index number. The index number is an average percentage figure which shows the average change in prices. It is now in general use and is one of the most exact instruments of statistics. If we have been able to devise a method of measuring a dollar, we may be able to develop a scientific dollar which will be a factor in stabilizing business conditions.

A dollar is a unit of weight disguised as a unit of value. A unit of value must equal the purchasing power for which it is designed to serve as a measure. The dollar is generally considered stable because gold is stable. It is one-twentieth of an ounce of gold; it is stamped to certify as to its weight. To measure a dollar, however, we must measure in terms of commodities, where we find the index number constantly changing.

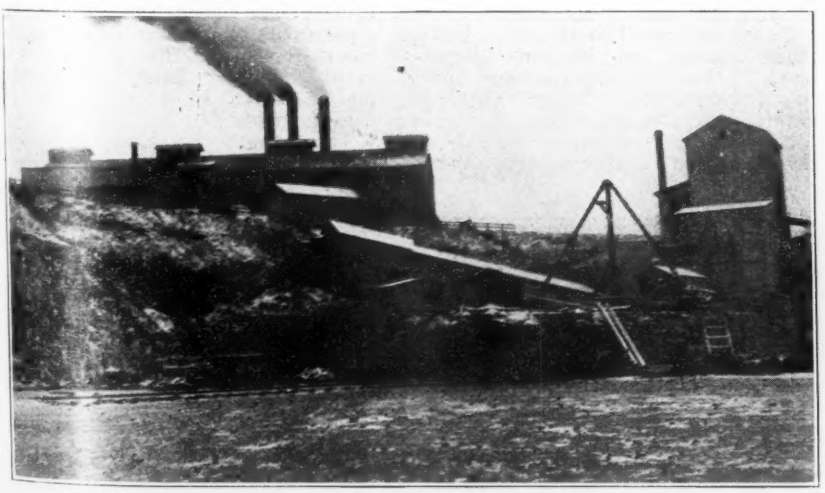
The price of gold does not change. Hence, since gold cannot be lowered, the price of everything else has to be raised. The price of gold is fixed; the price of everything else is determined by supply and demand. Our gold dollar is fixed in weight and variable in value. We need a gold dollar that is fixed in value and variable in weight. The idea of stabilizing the dollar has been considered from time to time by economists and by bankers. A suggested plan is to change frequently the price of gold or the weight of the dollar just enough to maintain the same purchasing power. It is a problem which merits intensive study and the bankers of the future can solve it.

A Modern Canadian Wet Process Portland Cement Plant

The St. Mary's Portland Cement Company Operating One Plant Producing a Million Barrels Annually at St. Mary's, Ontario

PREVIOUS to 1912 all the rock cement plants in Ontario, Canada, were operating on the dry process. In 1912 the St. Mary's Portland Cement Company built and started operation of a wet process cement plant at St. Mary's, Ontario, using rock and clay. St. Mary's is about 25 miles from London, the fourth city in Ontario in population, with 61,369 people. Two 8x160 foot kilns were installed. The demand for cement increased and in 1917 it was found necessary to install a third kiln. Changes and additions were also made in the grinding equipment at this time. In 1921 a three-story reinforced concrete office and laboratory building 100x50 feet was built. The laboratories of this plant, both chemical and physical, are exceptionally complete and modern. The laboratory work is under the direction of Mr. A. G. Larson. Machine shops, blacksmith shops, etc., have been erected and equipped so that practically any repairs to equipment can be made. A very complete tool and store house has also been equipped and a unique balance of stores system is in operation that eliminates the danger of any shortage of necessary supplies. Duplicate units and many of the pieces of equipment are kept on hand. Today this plant is one of the most modern cement plants on the continent.

The stone quarry is adjacent to the plant. The track in the quarry has been laid out in two half circles with the incline to the crushing house at a common end to both half circles. The crushing house has been so located with relation to the stone quarry and the stone quarry worked that it will be unnecessary to alter the track arrangement for some time. A minimum of track has been laid and with the present location of the shovel only the locomotive need switch only twice to reach the foot of the incline to the crusher house. The stone quarry is worked in two ledges averaging 38 feet in depth. Drill holes for blasting are sunk by two Loomis clipper drills and secondary drilling is handled by two Ingersoll Rand tripod drills. The stone is loaded by Bucyrus steam locomotive shovels with 2½ yard dip-



A View of the Plant from Quarry.

Office Interior—Mr. Lind At Extreme Right.

pers into 5 yard Continental dump cars. The dump cars are hauled by Plymouth locomotives to the foot of the incline to the crusher building. The overburden in the stone quarry runs from two to eight feet. This overburden is stripped with a Bucyrus steam shovel, loaded into Continental dump cars and hauled by Montreal saddle tank locomotives to a dump pile out of the way.

There are two Loomis drills in the stone quarry, two Bucyrus shovels, one a 70 C and the other a 65 C model, two Ingersoll Rand tripod drills and eighteen Continental dump cars. The other quarry equipment consists of three Wilson duplex pumps and a stiff leg derrick.

The dump cars are hauled up the incline to the crusher house and dumped into a 60x48 Traylor crusher by an automatic dumper. From the crusher the stone passed to a number 7 Williams mill from which the stone is conveyed by a 30 inch 9 ply flat Goodyear belt conveyor to the stone storage building which is 60x80 feet and 30 feet high. A dust collecting system has been installed in the crusher building that effectively removes the dust. This system was devised by Mr. Lind, the general manager. It is a fan and pipe arrangement.

The stone is reclaimed from storage by a Hepburn overhead electric crane with a two yard bucket and

A View of Chemical Laboratory.

A View of the Physical Laboratory.

loaded into a hopper. This crane runs the full length of the building. From the hopper the stone is conveyed by a Goodyear belt to bucket elevators which deliver to bins over the kominuters.

Ingersoll Rand Jackhammers are used for breaking in the clay pit. The clay is loaded by a Little Giant shovel into five yard Continental cars and hauled by Plymouth locomotives to the clay storage building 60x60 feet and 38 feet high.

The clay is reclaimed from storage by a Hepburn overhead electric crane with a two yard bucket and conveyed to a Smidth wash mill. From the wash mill clay is conveyed by Wilson duplex pumps to concrete storage tanks. The clay is elevated from storage to the kominuter feeder tanks as needed.

The clay and stone are mixed in Smidth kominuters and then discharged into Link Belt bucket conveyors and carried to three Smidth trix mills. The proper size is fed to three Smidth tube mills.

The slurry is discharged into a sump and then handled by Wilson duplex pumps that convey it to storage tanks of two rows each with five tanks in a row. The slurry is agitated by compressed air. The slurry is drawn from these tanks and pumped to the Ferris wheel feeders by Wilson duplex pumps. The slurry is introduced into the kilns from the feeders.

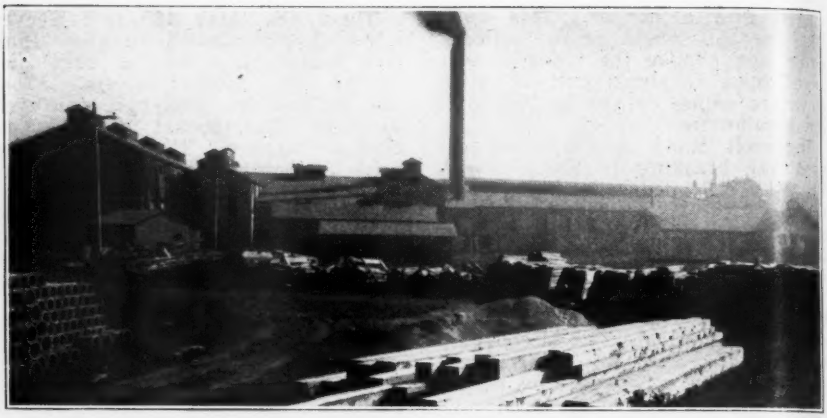
There are three 160 foot Reeves kilns. These kilns discharge to Link Belt elevators which in turn discharge into rotary coolers. From the coolers the clinker is conveyed by Link Belt bucket elevators to clinker storage. There are three brick lined rotary coolers in front and below the kilns that serve to preheat the air going into the kilns. The clinker coming from the coolers is measured by an automatic measuring machine that automatically records the amount of material passing.

The clinker is reclaimed from storage, gypsum added and the material carried by Goodyear belt conveyors to three Fuller mills. From the Fuller mills the material is conveyed by Link Belt bucket elevators to the tube mill feed bins. From these bins the material goes to three Smidth tube mills. The tube mills discharge into Link Belt bucket elevators that in turn discharge into Link Belt screw conveyors. These screw conveyors distributed the cement to the stock house.

The cement is reclaimed from the stock house by Link Belt screw conveyors and delivered to bucket elevators which deliver the material to the packing bins over the seven Bates packing machines. A dust collecting system has been installed in the packing house similar to the one in the stone crushing building.

Cement is either loaded to the cars directly from the Bates machines or

A Quarry View—Note Overburden Dump Pile.



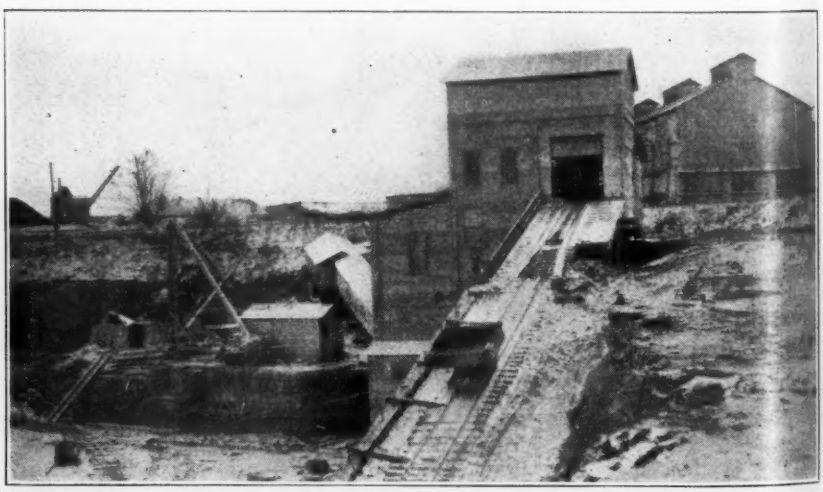
A General View of the Plant.

stored in a sack storage warehouse. The sacked cement going to the warehouse is conveyed by a Goodyear belt conveyor.

The coal is delivered in cars unloaded and placed in storage by a McMyler locomotive steam shovel. Link Belt screw conveyors reclaim the coal from storage and deliver it to bucket elevators that lift the coal to hoppers over two Commer dryers. From the dryers the coal is delivered to two 42 inch Fuller Lehigh mills. A magnetic separator removes all tramp iron and other foreign and injurious material. The pulverized coal is conveyed from the Fuller mills to pulverized coal hoppers in front of the kilns by a Link Belt screw conveyor. The pulverized coal is fed to the kilns by an air system devised by Mr. Lind, general manager of the St. Mary's Portland Cement Company.

The plant is operated by electric power purchased from the Hydro-Electric Power Commission of Ontario, which is one of the largest power transmission lines in the country. Westinghouse motors are used throughout the plant. An Ingersoll Rand 100 H. P. air compressor is installed for supplying compressed air.

The company employs 160 men in the plant and they have all good records of service. The problems of la-



View from Quarry Showing Incline to Crusher.

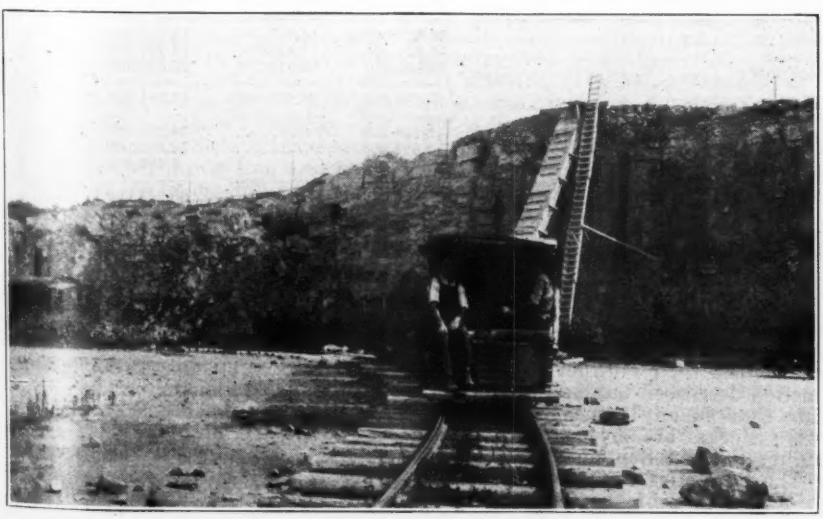
bor turnover which is such a great factor with most producers is of little trouble to the St. Mary's Portland Cement Company. The men are paid good wages. The safety features of the plant are excellent. A hospital room has been provided in the office building with a supply of medicine and first aid equipment. The working shifts are so arranged that the employees have the maximum time off. The plant is only a few minutes walk from the center of St. Mary's, a town that has a great community pride. St. Mary's is a town of homes. The majority of these homes are owned by the occupants and each owner seems to take a pride in keeping a lawn and a little garden. The St. Mary's Portland Cement Company has built 20 homes on its property for the employees. Only white laborers are employed and they are all English speaking, being either Canadian or of English or Scotch birth or descent.

The property covers 500 acres of ground and the cement produced is known on the market as the Pyramid Brand. The sales offices are maintained in Toronto under the direction of Mr. Gooderman, the president. Shipments are made over the Canadian National Railway, which is the longest and greatest publicly owned railway system in the world. This railway has 22,000 miles of track and serves every community in Canada. The company is operating at the present time at about 70 per cent capacity. The capacity is 3,000 barrels a day or 1,000,000 barrels a year.

Interior View of Packing House.

Mr. Geo. H. Gooderham is president of the company. Mr. Alfred Rogers is vice-president and Mr. John G. Lind is general manager.

A straw vote of the building construction industry of New York by the Electrical Board of Trade on the question, "Is business getting better or worse?" resulted as follows: 63.2 per cent reported business getting better; 31 per cent reported it getting worse; and 5 per cent reported it standing still.



A View Showing Single Track to Shovel.

Portland Cement Statistics September, 1924

THE following tables, prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on the reports of producers of Portland cement but in part on estimates. The estimates for September, 1924, were made necessary by the lack of returns from two plants. Shipments in September maintained their high level while production decreased but was at a higher rate than in any month except August. Stocks are over 51 per cent higher than in September, 1923

Production and shipments of finished portland cement, by districts in September, 1923 and 1924

Commercial District	Production, September		Shipments, September	
	1923	1924	1923	1924
Eastern Pa., N. J. and Md.	3,293,000	3,528,000	3,780,000	4,247,000
New York	726,000	765,000	788,000	901,000
Ohio, Western Pa. and W. Va.	1,327,000	1,628,000	1,495,000	1,752,000
Michigan	876.000	986,000	838,000	1,169,000
Wis., Ill., Ind. and Ky.	1,893,000	2,128,000	1,927,000	2,825,000
Va., Tenn., Ala. and Ga.	779,000	1,083,000	731,000	1,138,000
Eastern Mo., Ia. and Minn.	1,367,000	1,478,000	1,408,000	1,777,000
Western Mo., Neb., Kan. and Okla.	1,009,000	1,009,000	1,001,000	1,043,000
Texas	367,000	343,000	305,000	380,000
Colo. and Utah	293,000	262,000	244,000	269,000
California	909,000	1,015,000	874,000	1,011,000
Ore., Wash. and Mont.	270,000	294,000	307,000	315,000
	13,109,000	14,519,000	13,698,000	16,827,000

Production and shipments of finished portland cement, by months, 1923 and 1924, in barrels.

Month	Production		Shipments	
	1923	1924	1923	1924
January	7,990,000	8,788,000	5,628,000	5,210,000
February	8,210,000	8,588,000	6,090,000	5,933,000
March	9,880,000	10,370,000	10,326,000	8,995,000
First quarter	26,080,000	27,746,000	22,044,000	20,138,000
April	11,359,000	11,726,000	12,954,000	12,771,000
May	12,910,000	13,777,000	14,257,000	14,551,000
June	12,382,000	13,538,000	13,307,000	15,036,000
Second quarter	36,651,000	39,041,000	40,518,000	42,358,000
July	12,620,000	14,029,000	13,712,000	16,614,000
August	12,967,000	15,128,000	14,971,000	16,855,000
September	13,109,000	14,519,000	13,698,000	16,827,000
Third quarter	38,696,000	43,676,000	42,381,000	50,296,000
October	13,350,000	.....	14,285,000	.....
November	12,603,000	.....	10,251,000	.....
December	9,997,000	.....	6,408,000	.....
Fourth quarter	35,950,000	.....	30,944,000	.....
Preliminary total	137,377,000	.....	135,887,000	.....
Amount of under estimate	83,238	.....	25,118	.....
Final total	137,460,238	.....	135,912,118	.....

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in August, 1924, amounted to 192,634 barrels, valued at $305,690. The total imports in 1923 amounted to 1,678,636 barrels, valued at $2,964,098.

The imports in August were from Belgium, 104,756 barrels; Norway, 51,967 barrels; Denmark, 20,160 barrels; Netherlands, 5,999 barrels; England, 3,485 barrels; Sweden, 2,794 barrels; Canada, 2,722 barrels; France, 626 barrels; Japan, 125 barrels.

The exports of hydraulic cement in August, 1924, were 85,883 barrels, valued at $251.904, of which there were sent to South America 32,964 barrels; Cuba, 25,444 barrels and the other West Indies 5,1f6 barrels.

The Economics of Rate Making

Written expressly for PIT AND QUARRY by JOSEPH H. DONNELL.*

This article is the first of a series to appear in Pit and Quarry on the subject of the economics of rate making and rate structure by Mr. Donnell.—EDITOR.

TRANSPORTATION is today second to no other phase of business activity as an important part of our economic life. The growth and development of our country and its commerce have been nothing short of phenomenal. This would not have been possible without a corresponding development of our transportation facilities. Unquestionably transportation, more than any other single factor, has contributed generously to the building of industry, to the elevation of our standards of living, to the free interchange of intelligence, to our social and intellectual welfare. It is therefore of utmost importance that the business man know more of transportation, especially those phases of it which are intimately related to his immediate welfare. It is well also that the layman, whether a shipper of commodities or not, know something of those phases of transportation which inevitably affect every individual.

Like butter and eggs, transportation is bought and sold. It is one of the most necessary commodities entering into human existence. The carriers whether railroads or highway carriers, sell transportation to the public. It is all they have to sell, and it is therefore essential that it be of the most efficient character. Efficient transportation creates tonnage or traffic; slipshod, inefficient transportation discourages production and tends to retard or decrease the volume as well as the flow of traffic. Like the manufacturers of shoes, sewing machines or sealing wax, the railroads, manufacturers of transportation, must dispose of their product at a price which will enable profitable operation of their properties and at the same time be low enough to encourage the widest and utmost use of their products. They must enlarge and develop the market for their services and supply a sufficient quantity of high grade product to meet the demand.

Commerce must be adequately sound. The freight rate which is the unit price of transportation is based upon definite principles. A rate structure is not unlike a huge office building. Neither one "just happened" although there is a popular belief that the average rate structure is more or less a hodge podge, a result of evolutionary growth. This belief may be justified in the same sense that a completed skyscraper is a conglomerated mass of steel, cement, stone, glass, plumbing, flooring, fixtures and miscellaneous other commodities; yet in the completed structure there is a distinct place for each one of these many articles and a good reason for its being in that place. Thus with a rate structure what appears to the layman as an unintelligible mass of figures, is in reality the sum total of many individual rates, each serving a distinct purpose, each established only after careful study and a full consideration of the circumstances and conditions incident to, and the character of the traffic upon which the rate applies.

A railroad in establishing a freight rate or price upon its product is confronted by a vastly greater number of perplexities than the average manufacturer has to contend with in figuring the price upon his particular product. The entire business of a shoe manufacturer involves at best but a few commodities; hides, leather, and possibly a few accessory articles. This is true of the average producer of a single commodity. In establishing his prices he must consider raw material costs, transportation costs, capital investment, overhead and profit. His price will reflect all of these considerations and may vary somewhat in different markets, because of competitive conditions.

The railroad must not only consider all of these things when establishing its freight rates, in connection with its own product, transportation, but it must also consider the peculiar characteristics of and conditions incident to the sale and transportation of all of the commodities which it carries. Thus its prob-

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lems are multiplied and their solution requires very painstaking effort coupled with the securing of accurate information and the exercise of a nicety of judgment, seldom if ever required in any other line of business endeavor. That rates should be established in a haphazard manner is unthinkable. Such procedure would result in economic chaos and irreparable damage to the nation's business. On the contrary definite principles of rate construction must be observed. These principles are nothing more than economic laws, their application being tempered with an expert knowledge of the conditions which must be met in connection with individual commodities and territories. This tempered application is necessary in order to bring these laws into harmonious relation with the technology of transportation.

A carrier's revenues are derived through its rates. In order to realize a profit revenues must exceed expenses. Any excess of revenue over and above expenses is disposed of in several ways. Dividends must be paid to stockholders, interest must be paid on bonded indebtedness, and outstanding bonds must ultimately be retired. A reserve fund must be built up from year to year in order to liquidate these bonds when they mature. Improvements must be made in the existing plant; from time to time new equipment must be bought to replace old and wornout equipment as well as to provide additional facilities for the transportation of increased traffic. Lines must be extended in order to develop new territory and to keep pace with business expansion.

A carrier may reasonably expect to encounter unprofitable periods of operation. That is one of the normal hazards of business, but it should be able to average a profit on its operations over long periods, or it would ultimately become bankrupt. From the standpoint of revenues, the productivity of the general level of rates exercises a distinct influence on individual rates. If adequate earnings are being derived through the carrier's rates as a whole, it is in better condition to provide a reasonably low rate on an individual commodity or between certain points than if its rates were unproductive and its revenues inadequate. That the carrier's revenues must be considered in the making of rates is evidenced by an expression of the Interstate Commerce Commission in 20; I.C.C. 307. "The question of revenue must play a not inconsiderable part in determining the reasonableness of rates." In another case (National Hay Association versus Michigan Central Railroad Co. 19 I.C.C. 34) the Commission said, "The ultimate test of reasonableness of rates with the carrier itself is the return for the use of its equipment and facilities." From these two decisions it may be gleaned that the question of revenue while not the sole determining factor in establishing the reasonableness of a rate, is none the less an important one and must receive due consideration. Further, the carrier's return on the use of its facilities while an important test of reasonableness from the standpoint of the carrier is not necessarily determining from the shipper's side of the case. There may be and doubtless would be many other factors to be considered in determining the correct measure of a particular rate. Some of the more important of these factors may be classified as:

1 Cost of service
2 Value of service
3 Distance and regularity of movement
4 Volume of traffic
5 Character and value of commodity
6 Railway competition
7 Market competition
8 Water competition
9 Commodity competition
10 Legal factors and miscellaneous other considerations

The Commission wants the carriers to operate on a profitable basis. Otherwise they would be unable to attract capital, their credit would be impaired and they could not continue to render efficient transportation service. The Commission has said, "If the present system of private ownership of railways is to be continued, sufficient inducement must be extended to private investors." (City of Spokane vs. Southern Pacific Railway Company—15 I.C.C. 376.) Certainly private investors would not knowingly be attracted to investments of doubtful value. The foregoing has served to impress upon our minds the importance of transportation, and the fact that rates must be predicated upon established principles. Mention has also been made of what some of the outstanding principles are. Before proceeding to a more detailed discussion of each principle, there are two

things to be borne in mind. (1) In establishing rates, it is necessary to determine the correct principles to be used in order that all principles having a bearing on the case may receive consideration. (2) Principles applicable to the case having been determined, they must be correctly applied.

Cost of Service

The element of cost, that is, the cost, to the carrier of rendering service, is not the sole determining factor of rate making, but it is an important one. It is perhaps of greater importance to the carrier than to the shipper, since the shipper's interest is principally in the rate than the carrier's costs. However, since costs affect rates, the shipper is indirectly interested in costs also. Cost of service may be said to represent the minimum level of rates since to make rates below cost would result in unreasonable depletion of the carrier's revenues, which should always exceed the level of expenses. There are times when the carriers will shrink their earnings through the establishment of very low rates for the purpose of building up traffic. For example, a carrier may desire to aid in the upbuilding of a new industry located on its tracks. It may make rates on the products of this firm or on its inbound raw materials, reflecting a very small margin above the cost of service, hoping to be adequately compensated therefor by the gradual upbuilding of a large flow of traffic. When the industry becomes well established and better able to pay higher rates, the rates will be raised to yield the carrier higher net earnings on the service it performs for the industry.

The cost of service principle can seldom be used by itself in determining the reasonableness of rates. Used alone it would often result in unreasonably high rates or unreasonably low rates. That a rigid adherence to the cost theory would have far reaching and perhaps undesirable effects is indicated by two excerpts from decisions of the Interstate Commerce Commission. The Commission said (New York Harbor Cases, 47-I.C.C.-643), "A rigid application of the cost principles makes a complete change in the whole rate structure here under consideration," and "The Commission cannot condemn a rate solely because it is not constructed on the principle of cost of service."

The railroad must determine its level of costs before it can estimate the amount of revenue necessary to defray costs and provide profits. Rates are then made to produce the necessary revenues. In estimating costs, they must include capital costs or charges and operating costs. The burden of producing revenues to offset these costs must then be distributed over every commodity that the railroad transports, either through the medium of specific commodity rates or through classification ratings applicable on articles for which no specific rates have been provided. This distribution process is not an exact science but calls for an expert knowledge of the transportation characteristics of many commodities and the exercise of good judgment. Nor can it be resolved into a mere mathematical computation. Thus it could not be said of a given commodity, that just because it comprised 5 per cent of all tonnage carried, it should produce a like percentage of the carrier's earnings. Distribution of the burden by this method would result in unjust discrimination against certain commodities and an undue preference for others.

There are many things other than volume to be considered when apportioning to each commodity its share of the burden incident to producing revenues. Some of these elements which affect costs in connection with individual commodities are:

1. The character of the commodity
2. Volume of movement
3. Value of commodity
4. Risk of handling
5. Susceptibility of damage in transit
6. Nature of equipment used
7. Special services
8. Speed required

There are still other factors which will be discussed at the proper place.

There are many commodities, the transportation of which involves all elements of cost affecting the average commodity, and in addition thereto, other elements, because of special services required and special equipment necessitated by the nature of the commodity. Live stock, for example, has to be fed and watered in transit. It must also move in special equipment, and a caretaker must accompany each shipment. All of the expense incurred by reason of these special features is in addition to the expense involved in handling an ordinary commodity requiring only ordi-

nary equipment and service. Lumber on the other hand would require very little care or attention during transit and would move on flat cars, perhaps the least expensive type of equipment used. Live stock and lumber both move in large volume and each contributes a good portion of the carrier's revenues, yet because of the inherent differences in the character of these commodities and a corresponding disparity of cost incurred in their transportation the carriers must exercise good judgment in apportioning to each its proper share of the burden of producing revenues. It would be economically wrong to have unduly low rates on one and unduly high rates on the other. Rather should each one bear rates which reflect its transportation characteristics and which are made with some relation to the costs encountered in the handling of each commodity.

Costs incident in the handling of stone and gravel would likewise be very low in comparison with the transportation costs on live stock. Gravel loads heavily, may be loaded into open top equipment, moves in large volume, entails no special services, is relatively free from susceptibility to damage, involves few claims. Its value is low, and altogether it is a desirable commodity from a transportation standpoint.

It is difficult in fact almost impossible for the carriers to decide with any degree of accuracy what it costs them to handle individual commodities. They know that their costs are low on some commodities as compared with others. No great amount of science is necessary to discover that fact, but to determine exact costs is a difficult and often an impossible task. Until recent years the carriers' cost accounting methods and facilities for determining costs have left much to be desired. Conditions have improved in recent years, and costs can be estimated more closely now than formerly; but conditions are still such and due to certain conditions, will remain so as to render it impossible to arrive at exact handling costs on individual commodities. Such costs may, however, be approximated and although not conclusive in determining the reasonableness or unreasonableness of rates, yet furnish a basis for consideration and therefore play an important role in the establishment of rates.

Elements Affecting Costs

In considering those elements which affect costs it is logical to consider first those costs which must be incurred first by the carriers. Thus we have capital costs or fixed charges. A carrier must have a plant before it can operate at all. It must have a right of way, a franchise, road beds, tracks and terminals. The expense incurred in securing these necessities does not vary with the volume of traffic and is therefore termed "fixed" expense. Fixed charges of the average railroad have been variously estimated at from 30 to 50 per cent of its total expense. This percentage necessarily varies with different railroads and depends on mileage, character of the territory covered, number and location of terminals, telegraphy of the country and various other conditions. Fixed charges must be incurred by a railroad regardless of what its later operation may call for.

Then there are the various items of operating expense. Operating expense considered in the aggregate is variable. It will fluctuate with the character and volume of the traffic handled. Yet in one sense operating expense may be considered both fixed and variable. Thus a carrier before it can operate at all must place itself in a position to handle any traffic which may be offered to it. Regardless of traffic volume, it must provide itself with a certain amount of motive power, a number of employees and a quantity of rolling stock, car equipment, etc. The minimum amount of money thus expended by a carrier each year over a period of years may be said to comprise the fixed portion of its operating expense. Operating expense incurred over and above that amount necessarily fluctuates with the volume of traffic and the character of the traffic handled; consequently this additional expense may be said to comprise the variable portion of a carrier's operating expenses. The fixed and variable portions of operating expense will also vary in proportion to each other on different railroads, due to the diversified conditions encountered by railroads serving different sections of the country, different standards of efficiency prevailing on individual roads, and other conditions which make it practically impossible to strike an average on any intelligent basis.

The fact that all costs, including capital charges which are largely sta-

tionary and operating costs which are in the aggregate variable, must be jointly considered and applied results in the term "joint costs"; and it is largely because costs are "joint" that they may not be accurately allocated to individual commodities. Now in considering those elements which affect and largely determine the measure of the carrier's costs, let us start with capital costs, including among other things such representative items as rights of way, road beds, tracks, terminals, taxes and interest on invested capital. Rights of way may be secured from four sources:

1. Federal Government
2. Municipalities
3. States
4. Private Land Owners

The Southern Pacific Railway is typical of those carriers who have secured land from the Federal Government. This land has cost the carrier very little. It was given by the government to encourage the building of the road and a consequent development of unsettled areas. In consideration of these free land grants, the carriers agree to transport persons and property for the government without charge or in other cases at reduced rates. These rates are known as "land grant" rates.

Carriers sometimes secure rights of way from cities and other municipalities without cost, the land being offered to attract the carriers to a city. At other times the carriers are compelled to pay high prices for such property. In the case of state land grants, the carriers have secured some lands without cost and have had to pay for other lands.

In the case of a carrier securing land from an individual land owner, it may be said that the carrier not only pays for the land as a general rule but usually pays upon the basis of a high valuation. The average land owner upon discovering that his land is needed or desired by a railroad suddenly discovers that it is far more valuable than he had ever dreamed it would be and attempts to sell it to the railroad on that basis. The railroads have paid out hundreds of millions of dollars in securing rights of way and terminal properties from private land owners.

The construction of road beds involving grading, laying of ballast, tunneling, bridge building and other expensive operations is a source of major expense to the railroads. Track laying involves a tremendous financial outlay for labor and material. Terminal expense is an important item. In large cities especially does it involve the investment of millions of dollars for miles of trackage, adequate freight house facilities and passenger stations.

Taxes are now such a large item with the carriers that in recent years more of the carriers revenues have been diverted to the paying of taxes than to the paying of dividends. Interest on invested capital is a necessary expense. Railroad investors are entitled to a legitimate return on the money they have invested in rail properties. All of these items are included among necessary expenses of the carriers and comprise a large portion of their costs.

Operating Costs

After the carrier has established its plant and provided the facilities of transportation, it must begin to perform service. The costs which it then incurs in operating are known as "operating costs." For analytical purposes, these costs are best understood when considered as six groups.

1. Administrative Expense
2. Purchase and construction of equipment
3. Employees' compensation
4. Maintenance of properties
5. Actual transportation expense
6. Miscellaneous expense

A railroad's physical properties once established, there is then required a number of employees to administer them. These employees from the president down to the humblest employee must be compensated for their services, thus involving huge disbursements in the form of salaries and wages.

Motive power, rolling stock, shop equipment, supplies and various other items of equipment must be secured, involving additional expenditures. The properties and equipment must be maintained in good condition. Provision must be made for inspection, repairs and replacements, all of which require the constant spending of large sums. Actual transportation expense, including the provision of fuel, constitute a large portion of the carrier's costs.

By averaging the total tonnage over a period of years, and the total cost of transporting same, then deducting a reasonable percentage to allow for cost shrinkage or falling off of traffic, a carrier may establish ton-

nage and cost figures below which it may be assumed that tonnage and costs will not fall. Minimum costs so figured may be considered "fixed." Tonnage and costs above those figures will fluctuate from time to time depending on a number of conditions. For example, administrative expense may vary with the number of employees; equipment costs will vary with the volume of tonnage and the character of the traffic. Employees' compensation will not only vary with the number of employees but with the rise and fall of the wage scale. Maintenance costs will vary with the volume of traffic, weather conditions, and wear and tear on equipment. Actual transportation expense will vary with fuel costs and other elements. All miscellaneous expenses will fluctuate with the amount of transportation service performed and the varying conditions under which performed.

Elements Affecting Costs

There are certain elements or conditions which tend to increase or decrease railroad costs. They may be approximately classified as follows:

1. Terminals
2. Risk
3. Carload vs. less than carload traffic
4. Main line vs. branch line service
5. Direction of movement
6. Equipment
7. Speed
8. Railroad investment
9. Distance
10. Joint hauls vs. single line hauls
11. Loading and unloading
12. Competition

Discussing these elements in the order named, we consider first the matter of terminals. Obviously a carrier's costs at a terminal will depend in large measure on the character of the terminal, its size, location, volume of traffic passing through it and upon other conditions. Manifestly a terminal in New York City would involve greater costs than a terminal in a town of ten or twelve thousand persons. Properties at the larger place will cost more per unit and will involve more units. Freight and passenger stations, yards, track mileage, number of employees, all of these things must be maintained upon a much more commodious and extensive scale at large cities than at smaller ones. Absorption of switching charges in their rates is another source of expense occasioned by service rendered at terminals.

Risk of damage involved in the handling of shipments affects the railroad's costs and consequently its rates. Some commodities are very susceptible to damage in transit; others involve only a moderate hazard; while yet others are relatively free from susceptibility to damage and involve little or no risk on the part of the carrier. The Commission said in Fridsay and Co. vs. Northern Pacific Railway Co. 33-I.C.C-150, "Fresh tomatoes are highly perishable and loss and damage claims are heavy."

Thus the carrier's costs in handling tomatoes and similar commodities of a perishable nature are high and involve the necessity of higher rates than on the average commodity to offset the extraordinary amount of risk in their handling. Similarly grapes and drain tile involve heavy claims for damage in transit. Of the former the Commission said, "Basket tops become warped and expose grapes to waste and damage." Blackburn, Warden Co. vs. Illinois Central R. R. Company. 30-I.C.C.-58. Of drain tile the Commission said, "Claims for damages said to have reached 10 per cent of earnings as compared with general average of 2 per cent for all traffic." Drain tile from Illinois Points 35-I.C.C.-83. "Window glass is more liable to damage than glazed sash." "Stravine in bags is less desirable and a more hazardous article of commerce than stravine in barrels and should be rated higher." "Risk in the movement of plate glass is much greater that that of common window glass." "Loss and damage to small shipments are heavy." These are all excerpts from decisions of the Interstate Commerce Commission and indicate in some measure a few of the articles which by reason of their susceptibility to damage, have the effect of increasing the carrier's costs and therefore may be rated higher than would otherwise be the case.

Then too, certain commodities are apt to cause damage to other articles loaded in the same car. For example, liquids are not only susceptible to leakage but such leakage may contaminate other articles. If a barrel of vinegar loaded in the same car with sugar in bags were to spring a leak, in all probability the carrier would not only have to entertain a claim for

the vinegar leakage but also for the lot of damaged sugar.

On the other hand certain commodities involve comparatively little risk. Unglazed sash and doors, salt, leaf tobacco, wire, gravel, sand, crushed stone, building or roofing papers, all involving small risk and a consequent lessening of carrier liability, may be landed at relatively low cost and should enjoy relatively low rates. Of leaf tobacco and wire the Commission said, "There is but little risk in shipping leaf tobacco in any of its forms," (37-I.C.C.-166) and "There is practically no danger of loss or damage in transportation of flat or round wire." (American Steel and Wire Company vs. A and B Ry. Co. 37-I.C.C.-525)

The handling of less car load traffic involves higher costs than transporting carloads. In a case involving rate increases in New England (49-I.C.C.-421) the Commission said, "The prevailing impression that less than carload traffic is generally unremunerative, is supported by the evidence in this and other cases." Thus less car load traffic costs must be higher than costs for carload traffic because notwithstanding the higher rates exacted for the former it fails adequately to compensate the carriers for handling it. The higher rates do not offset the higher costs. There are reasons why less carload costs should be higher than carload costs.

Carload freight is usually loaded and unloaded on the private siding of the shipper or consignee and by the shippers and consignee's employees. Less than carload freight is usually loaded and unloaded at the carrier's freight house by the carrier's employees and involves on the carrier's part an expenditure for labor as well as for the facilities used, storage space in the freight house, etc., which it does not incur in connection with carload freight.

Less carload freight necessitates a much greater amount of clerical work for the carrier's employees to do than does carload freight. For a carload shipment single bill of lading and one freight bill will suffice, but for a single car of less carload shipments, the shipping documents and the labor incident thereto are multiplied many times. As many as a hundred bills of lading and freight bills may be necessary thus adding to the carrier's costs.

Carload traffic usually involves the loading of but one commodity in the car, thus promoting compact storage and a corresponding decrease in risk of danger due to shifting of the load. Less carload freight may result in many commodities of dissimilar character being loaded in a single car, with the attendant possibility of loose loading and consequent shifting of the load in transit and consequent damage to the contents of the car. Furthermore, the frequent disturbance of the load due to necessary transfers of less car load freight tends to promote breakage. Thus claims in connection with less carload freight are much more numerous than in connection with carload shipments, and this is another important reason why the carrier's costs of handling less carload freight are higher than their carload costs.

Whether service rendered by a carrier is on the main line or on a branch line is another factor affecting the railroad's costs. The volume of traffic on a branch line is usually much lighter than on the main line, and shipments, on the average, move for shorter distances than on the main line, these factors having the tendency to increase the cost of service.

This may better be appreciated when it is considered that the carrier has to furnish just as much equipment for a short haul as for a longer one, and its revenue from the short haul is much less than from the long haul. Having furnished a locomotive and car, it could with relatively little more expense haul a shipment two or three times the average distance required on the branch line. Similarly it could with economy haul heavier loads than are usually available on the branch lines. The Interstate Commerce Commission has recognized and frequently declared that rates on branch line traffic should be higher than on main line traffic for the reasons just mentioned. Thus in the case of Burton vs. West Virginia Railway Company (20-I. C. C. 75) it said, "The per ton mile earnings of a small carrier having only short hauls and light business may properly exceed the per ton mile earnings of stronger lines participating in heavier traffic which moves for considerable distances." Other expressions of the commission are, "Rates on a branch line may lawfully be higher than on main lines serving the well developed territory where the density of traffic is much greater" (19—I. C. C.—156). "Rates on a branch line on traffic

coming in over another line may be higher than on the main line" (18—I. C. C.—105). "Carriers may make an additional charge for branch line service" (43—I. C. C.—420).

Other elements affecting the carrier's cost of rendering service and other principles of rate construction such as value of service competition, etc., will be treated in subsequent articles.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,508,573. Excavating-machine. Clarence E. Parker, Minneapolis, Minn.

1,508,639. Bucket. Fitch H. & Fred S. Beach, Charlotte, Mich.

1,509,005. Crushing-rolls. Francis J. Straub, New Kensington, Pa.

1,509,187. Grab-bucket. William C. Bolgiano, Cleveland, Ohio, assignor to Brown Hoisting Machinery Co., same place.

1,509,260. Sand and tile washing and separating machine. Olof N. Rikof, Broxbourne, England.

1,509,646. Trench and tunnel excavator. James C. French, Cleveland, Ohio, assignor to F. C. Austin Machinery Co., Chicago, Ill.

1,510,546. Apparatus for handling gravel. Harry G. Cordier, Frankfort, N. Y., assignor to Acme Road Machinery Co., same place.

1,510,682. Gravel-cleaner. John Klepach, Cedar Rapids, Iowa.

1,510,683. Gravel-cleaner. John Klepach, Cedar Rapids, Iowa.

1,510,684. Gravel-cleaner. John Klepach, Cedar Rapids, Iowa.

1,510,742. Sand and gravel screen. Christian T. Gutleben, Oakland, Cal., assignor to Gutleben Brothers, San Francisco, Cal.

1,511,114. Excavating-machine. Robert R. Downie, Beaver Falls, Pa., assignor to Keystone Driller Co., same place.

1,511,436. Excavating machinery. Svante R. W. M. Bager, South Milwaukee, and Otto F. Kaeser, Milwaukee, Wis., assignors to Bucyrus Co., South Milwaukee, Wis.

New Incorporations

The Marble Products Company was recently organized by Kansas City business men for the manufacture of artificial marble. This product is a building material made of cement chemically treated to give a glossy surface. This process was invented by J. J. Burke, a Kansas City engineer. Officers, to be elected at the first meeting, will be Charles W. Bartlett, president; Eldred Tarry, vice-president and general manager; Frank W. Peck, treasurer; and M. W. Borders, secretary.

Leonard Stone, Inc., mine and quarry for stone, sand, etc., was recently incorporated at Wilmington, Del., for $30,000, by Samuel C. Wood, Harry C. Hand, Raymond J. Gorman, New York City.

The Dorer-Schueler Company of Milburn, N. J., was incorporated for $125,000 to manufacture cement blocks, by Milton M. Unger, Newark.

The Worby Sand and Gravel Company of Harrison, Wis., has been organized to deal in sand and gravel.

C. C. Fleshman of Turlock, Cal., has established a sand, gravel, and rock plant at Cressey, Stanislaus County, Cal., with a capacity of from 150 to 200 tons a day.

The Founders Sand & Supply Company of Detroit has closed a deal for the sand rights on 200 acres of fine molding sand near New Lexington, for a consideration of $50,000. They will spend $200,000 on machinery. It is reported the Ford Motor Company will take the entire output in 1925. Experts say there are 3,000,000 tons of sand on the ground.

The Dredge Gravel Company was recently incorporated at Denver, Colo., for $25,000 by Milton B. Hood, Paul A. Page, and Carrie M. Page.

The Hattiesburg Gravel and Sand Company of Wilmington, Del., was recently incorporated for $40,000.

The sand properties of Charles T. Eastburn, near Cleveland Avenue, Lower Morrisville, Pa., just across the Delaware River from Trenton, N. J., have been acquired by Hugo Spalinski, and associates, who will continue the business as heretofore. The Empire slate quarry, Slatedale, Pa., has been leased by Harding, Hoefleck & Foulke, who will proceed with production.

Canada Crushed Stone Corporation Operates Three Plants in Canada

Stone Quarries at Dundas, Hagersville and Vinemont Ontario The Modern Fireproof Dundas Plant Producing 4000 Tons Daily

THE Canada Crushed Stone Corporation, Limited, with offices at Dundas, Ontario, Canada, supply nearly all of Ontario with stone from their three quarries. The main offices are at the Dundas quarry which is about five miles from Hamilton, Ontario.

The stone quarried at both Dundas and Vinemont is a good dolomite while that at Hagersville is a calcite stone.

Two types of rock are exposed and worked at Dundas; a dark grey and black dense dolomite which is quite tough and has many bituminous partings and a course yellow gray dolomite which is not so tough. The dark grey dolomite is 32 feet thick and is overlaid with 18 feet of yellow gray dolomite. This upper 18 feet belongs to the Guelph Dolomite and the lower 32 feet belongs to the upper beds of Lockport Dolomite.

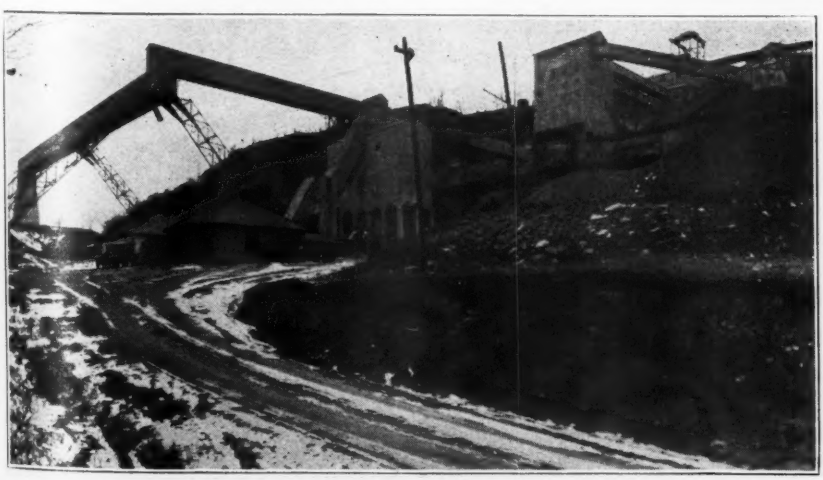
The plant at Dundas is built of steel and concrete throughout and one of the most modern plants on the continent. The plant is located on the main line of the Canadian National Railway on the north side hill of a valley three miles wide. The quarry is on top of the hill and the plant so arranged that elevating machinery is not necessary.

The loading bins are above the tracks of the Canadian National Railway about a quarter of the way up the hill. The primary crusher is at the top of the hill about 250 feet above the loading tracks. The quarry is located northeast from the primary crusher. The quarry is worked in two levels about 27 feet each. The quarry has been opened to about an area of 600x1000 feet.

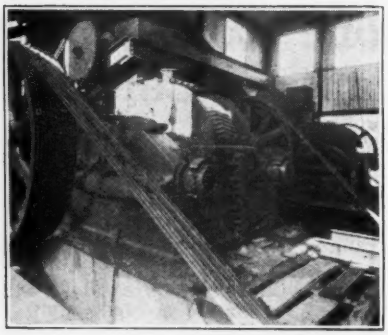
The drilling in the quarry is handled by 12 Sanderson Cyclone drills. Three steam shovels with 3½ yard buckets load the material into 4 yard Western dump cars and hauled by Vulcan locomotives to the primary crusher. Two of the three shovels mentioned are Marion Model 91 and the other is a Bucyrus Model 100 C.

Stripping averages about 10 feet and is loaded by a Thew revolving electric shovel into 4 yard Western dump cars and deposited in a fill pile on the abandoned side of the quarry.

The quarry tracks approach the primary crusher on a steel trestle. This primary crusher is a 42x136 Mc-



A View of Plant From Truck Approach.



The Garfield Rolls.

Cully set on concrete foundations and driven by a 250 H. P. Westinghouse motor. The crusher discharges into two concrete bins from which the stone is delivered by Link Belt conveyors to two 72x30 inch Garfield rolls. The crusher has a double discharge. The Link Belt apron conveyors are made up of 30x¼ inch bottom plates and 9x⅜ inch side plates and carried on a steel framework by a steel roller chain driven from the main shaft of the Garfield rolls. Clutches on the countershaft control the conveyors independent of the Garfield rolls.

The two Garfield rolls are driven by a 250 H. P. Westinghouse motor. The house containing the rolls is steel throughout with corrugated roof and sides and steel plate floors.

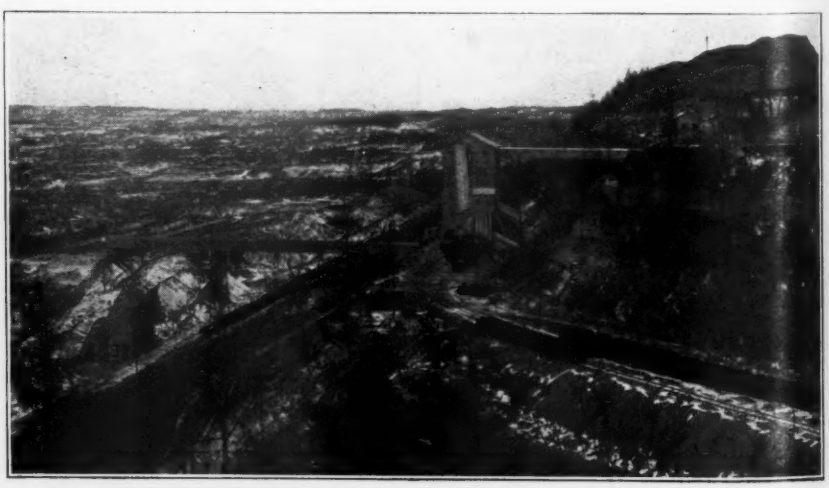
The material coming from the rolls is delivered by a 30 inch horizontal belt conveyor running at 300 feet per minute to hoppers that feed four Allis Chalmers 60 inch by 25 feet revolving screens equipped with 11 foot dust jackets.

The conveyor mentioned is 325 feet centers running in steel covered housing with steel plate floors and plenty of steel sash windows. These conveyor houses each have a 142 foot span supported by steel framework. The starting end of these housings rest on the foundations of the roll house and the discharge end rests on the roof of the screen house.

Double decked 7x12 feet Allis Chalmers compensating shaking screens receive and size all material passing the dust jackets of the revolving screens. Two 75 H. P. Westinghouse motor drive the screens and belt conveyors. Each screen and conveyor is controlled by a clutch so that any piece of machinery can be stopped and started independently of any other machine.

The screen house is of steel construction throughout with steel floor plates, corrugated steel roof and sides with steel sash windows, Baffle plates, chutes, supports are all steel. In fact the only wood in the entire plant is the timbers under the motors and the sleepers carrying the belt conveyor stands. The screen house is 50 feet square and the top of the screen house is about 90 feet above the tracks.

The screen house is built on top of the reinforced concrete bins which are



Plant View Showing Shipping Tracks and Bins.

52x50 feet with a capacity of about 2100 tons. The loading bins span three railroad tracks. The spouts are hung from the screen floors and built of steel with renewable plates wherever there is any wear.

Oversize and 2 inch stone are stored in the north row of bins on the same side as the recrushing plant. This recrushing plant is a steel and concrete building equipped with a number 4 McCully crusher,, one set of 54x24 inch Garfield rolls and one number 15 American ring pulverizer. Material is conveyed from the storage bins to the recrushing plant by short Link Belt apron conveyors.

An inclined 30 inch belt conveyor running from the recrushing plant conveys material to the agstone building a distance of 155 feet. The stone may be diverted at the agstone building to another 30 inch belt conveyor that leads back to the screening house where it discharges to a hopper with spouts that distribute evenly to all four Allis Chalmers revolving screens. Stone may be passed over a Sturtevant screen with the oversize going to the second 30 inch conveyor which delivers to the screening house.

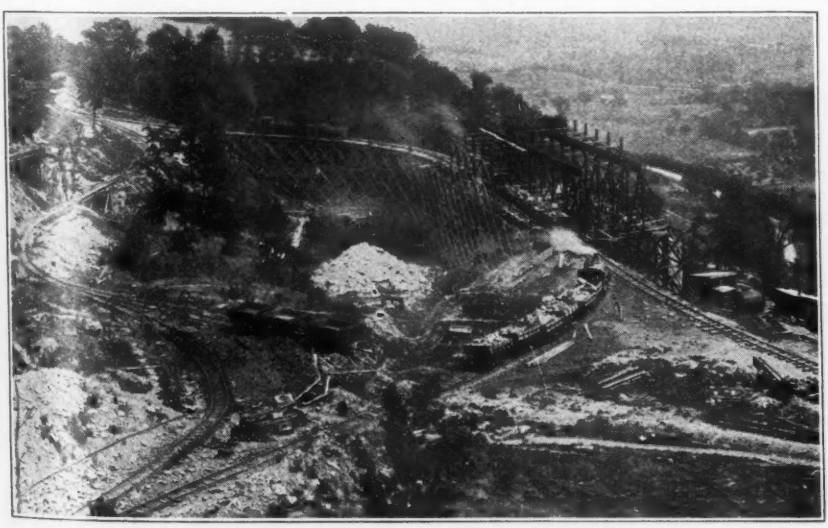
Agricultural limestone is sacked in a room 15x20 feet to the north of the storage bins. The Canada Crushed Stone Corporation has developed considerable of a market for these fine products.

A concrete tunnel beneath the loading tracks houses a reversible 24 inch belt conveyor that delivers either to the storage conveyor or to the 30 inch conveyor leading to the recrushing plant. This tunnel conveyor is so arranged with relation to spouts that any size stone from the bins may be delivered to storage or to the conveyor running to the agstone building. Stone may also be brought in on the loading tracks from the stock pile in cars and unloaded through the tracks to the reversible conveyor and returned to the plant for rescreening or recrushing.

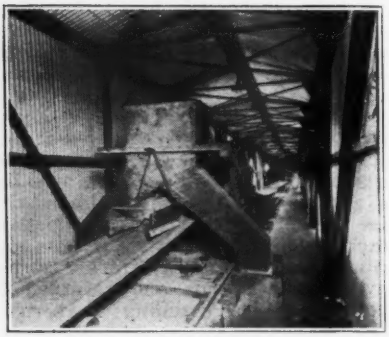
The north and south conveyor housings which span the Canadian National Railway tracks is about 300 feet long and houses a 24 inch belt conveyor which discharges to a similar conveyor in the east and west conveyor housing over the storage pile.

The storage pile is filled under this east and west conveyor housing by means of a movable tripper. These conveyor housings are all of steel construction with corrugated roofs and sides. The floor of the east and west conveyor housing is about 80 feet above the ground and the gross capacity for storage is about 150,000 tons.

The stone is reclaimed from this storage pile by means of a 24 inch Stephens Adamson belt conveyor running in a concrete tunnel under the storage pile. The stone is delivered



View Showing Trestle Approach to Crusher.



Interior Conveyor Housing.

by gravity to the belt conveyor through gates in the concrete roof slab of the tunnel. These gates are placed 20 feet apart.

A locomotive crane is used to load cars direct from storage or to operate an "Arrow" bottomless drag scraper for reclaiming through the tunnel the dead storage.

The reclaiming conveyor delivers to an elevator at the storage pile loading bins. Any material from the storage pile that needs to be recrushed is handled by a number 4 McCully crusher and a 60 inch by 20 foot Allis Chalmers revolving screen equipped with a 10 foot dust jacket.

Complete shops, warehouses, plant, office and office dining room are maintained on top of the hill. Supplies are delivered to this level by means of an inclined track connecting with the Canadian National Railway tracks about 3000 feet to the west. This inclined track is about 1200 feet long and on a 16 per cent grade.

This Dundas quarry was first opened in 1905 and operated by the firm Doolittle and Wilcox, Limited.

In 1912 the company was reorganized after the death of Mr. Wilcox and the name Canada Crushed Stone Corporation, Limited, adopted.

During the spring of 1922 the plant was closed down for repairs and the installation of some new equipment. The plant was largely of wooden construction at this time. On April 29, 1922 one of the partition walls in one of the bins caught fire and in less than an hour the screenhouse, bins, conveyor housing, etc., were reduced to ashes. The fire spread so rapidly that it was over before any action could be taken. It was immediately decided to rebuild the plant of fireproof construction throughout.

The plant was rebuilt in 50 working days. This feat was made possible only by the combined action of several forces. Mr. J. C. Buckbee of Chicago designed the new plant. The Hamilton Bridge Works of Hamilton, Ontario fabricated and erected the

View of Quarry Showing Two Levels.

steel buildings and the Russell Construction Company of Toronto handled the concrete work. Mr. Buckbee laid out a schedule of operations and through the co-operation of the equipment manufacturers, contractors, directors and officers of the Canada Crushed Stone Company the plant was rebuilt in record time. Everyone worked night and day and all were inspired by the enthusiasm with which Mr. Doolittle, the president, worked behind the plans.

The Hagersville quarry is situated about one-half mile from the center of the village of Hagersville and the company has direct connection with both the Canadian National Railway and the Michigan Central Railroad, and through the Michigan Central makes connections with the T. H. & B.; C. P. R.; R.M.; L. E. & N.; L. & P. S.; N. St. C. & T. and C. W. & L. E. railways. The property consists of 64 acres with little or no stripping and well drill tests show continuous lime stone for at least 100 feet.

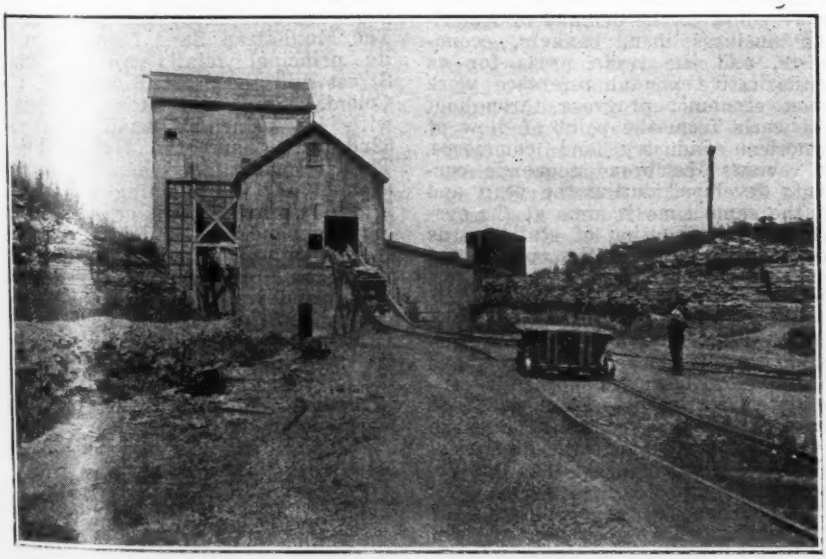
The quarry was opened for the first time sometime in the nineties but the first crusher was not installed until 1901 by Mr. J. C. Ingles who at that time was the president and manager of the Hagersville Contracting Company. It was operated continuously by Mr. Ingles under the name of the Hagersville Contracting Company until taken over by the present interests in 1919. The plant has a daily capacity of approximately 1,000 tons and the market is in South Eastern Ontario from Windsor to Niagara Falls, south to the lake with a reasonable freight rate as far north as Toronto. The market in the past has largely been for road work and of course a fairly good percentage of concrete work.

Hagersville Blue Stone for Rubble and road building has an enviable reputation in the Province of Ontario. Mr. Hartley Lindsay is Secretary of the Company.

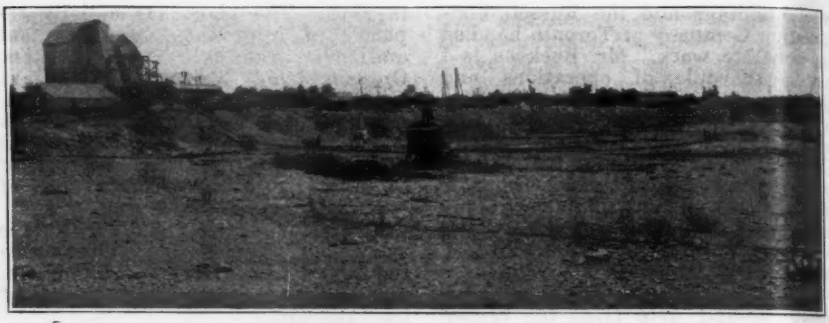
Wentworth Quarries situated near the village of Vinemont, Ontario, on the T. H. & B. main line from Toronto to Buffalo, were opened some sixteen years ago by F. W. Schwendiman who is the present manager for the Canada Crushed Stone Corporation Limited, the owners. The quarry has been operated continuously since that time, and many of the fine roads in that vicinity have been built of Vinemont stone. The capacity of the plant is one thousand tons per day. At present the quarry is working on a large ballast contract for the T. H. & B. Railroad.

Mr. C. M. Doolittle is president of the Canada Crushed Stone Corporation and Mr. W. J. Southham is vice-president and treasurer. Mr. J. B. Hart is secretary and Mr. R. G. L. Hartstone is works manager.

The Doolittle Russell Company



Incline and Crushing Plant at Vinemount.



The Hagersville Quarry and Mill.

Limited distribute the products of the company in Hamilton, Ontario, while John E. Russell Company Limited distribute in Toronto.

The general average results of some tests as given below present the relative merits of the stone from each of the three quarries.

	S.G.	Weight	Absorption	% of wear	French Co-Eff.	Hardness	Toughness	Cementing
Dundas Dolomite	2.76	173	0.60	3.63	11.04	15.33	11.62	Good
Vinemont Dolomite	2.70	168	0.98	3.95	10.53	12.80	9.00	Good
Hagersville Calcite	2.66	165	1.03	3.82	10.66	16.70	10.57	Excel't

The World's Business

THE second issue of Commerce Department's "Year Book" contains comprehensive economic information on domestic and foreign trade prepared under Secretary Hoover's supervision.

The Year Book has been prepared in response to the demand of American business men, bankers, economists, and the trade press for an authoritative annual reference work upon economic progress throughout the world from the point of view of American industry and commerce. It reviews the broad economic currents developed during the year, and at the same time it aims at the systematic consolidation of statistics as to production, distribution, prices and markets for American commodities over long terms of years.

Statistics of this kind have in the past found their way into many different publications, but they have never before been systematically consolidated for ready reference. The Commerce Year Book thus serves as a companion volume to the Statistical Abstract, published by the Department of Commerce.

In addition to the compilation of information with respect to American industries, the book contains a summary of the fundamental economic data in all of the important foreign countries.

Sand Merger Planned

In order to stabilize sand, gravel, grit and crushed stone prices and to provide an adequate all-season supply of these basic commodities in New York City, a million dollar merger of two of the largest distributors is planned, says Allen E. Beals in the Dow Service Daily Building Reports.

What is declared to be the largest single retail sand and gravel firm in the United States, if not the world, has been formed by the combination The Manhattan Sand Company with its principal retail yard at 62nd Street and the East River, and the Colonial Sand and Stone Company, with its principal retail plant at 52nd Street and the North River. This new company handles 5 per cent of all the building sand used in the United States, or more than half the sand used in New York city. It is equipped to deliver 5,000 cubic yards, or approximately 6,250 short tons, per day.

New York city is now using about 11,500 tons of sand a day, including the bank sand consumed locally by the Boroughs of Brooklyn, Queens and Richmond. This is a fair reflection of the volume of building construction at present, and exceeds all previous New York volume records.

The benefit of this merger to the individual builder is that if his job is in Manhattan or the Bronx, he will be able to get quicker deliveries than heretofore.

Operating Fires Under Boilers

Written Expressly for PIT and QUARRY by Daniel J. Hauer

THE operation of fires under boilers depends upon many conditions such as the way the boiler is set; the types of grates and combustion chambers and the character of fuel that is used, so that no hard and fast rules can be given for operating fires under boilers. It is possible, however, to make many suggestions based upon a general knowledge of the subject. There is always occasion for the use of sound judgment in handling fires.

The general theory in combustion, especially when coal is the fuel, is to mix sufficient air with the burning coal to develop rapid burning and thus producing efficient CO_2 combustion. With insufficient air and slow burning carbon monoxide gases are liberated and the heat units made available with the liberation of carbon monoxide gases from even good coal, will run only between 4,000 and 5,000 B.T.U. Additional oxygen will produce a quick burning fire, and liberate carbon dioxide for combustion and there will be made available 10,000 additional B.T.U. from each pound of coal consumed for water evaporation. Good grades of coal have from 12,000 to 15,000 B.T.U. for each pound of coal, and with efficient CO_2 combustion from 90 to 95 per cent of these units can be made available.

Coal can be consumed under a boiler at about the same rate per square foot of grate per hour, yet with carbon monoxide combustion, but little work will be done while with carbon dioxide a greater efficiency can be obtained. There must be enough air admitted to the fire box to give carbon dioxide combustion. With most grates there is not enough air admitted through the fire bed, except by stirring the fire continually to give the necessary air through the body of burning coal.

The size of the fire box and the ash pit should depend upon the size of the boiler whether the boiler is a self contained boiler or not. In the self contained boilers these boxes are smaller than boilers that have a brick setting. The sizes of the boxes for self contained boilers are decided upon by the manufacturers of the boiler, and are not easily changed, but the sizes of the fire box and ash pit, under the boiler with a brick setting can be made to suit the ideas of the boiler installer.

The ash pit should be of the same dimension as the grate area, and of such height for natural draft as to equal 50 to 75 per cent of the height of the fire box. For forced draft the depth is not so important. An ash pit should always be kept free from ashes. When fires are cleaned, all ashes should be drawn from the ash pit, and as fires are being attended, between the cleaning periods, the ashes should not be allowed to accumulate over five or six inches. An accumulation of ashes cuts off some of the air from the fire, and thus retards efficient combustion. Then, too, a volume of hot ashes under a grate will burn the grate bars, which is an added expense to maintain. If the ashes can not be withdrawn from the fire pit immediately and they are hot, water should be used to cool them. But water should not be used for this purpose in a Scotch or locomotive type of boiler, as it injures the metal. If hand stokers are used the ash pit should always be deep, as hot coals must be dumped from the grate. Grate bars in stokers are quickly burnt out if this precaution is not observed.

The fire box should always have a depth of three or four feet and even more for large boilers. There should be ample room for the gases as they are generated from the coal, to expand over a hot fire and become thoroughly heated so that enough air will be mixed to produce perfect combustion. Otherwise a large volume of carbon and other volatile matter will go into the stack without any benefit. The back combustion chamber should likewise be of sufficient size to hold these gases while combustion is taking place. Baffles of some kind in this chamber produce a beneficial effect and keep down high temperatures in the stack.

The air opening through grates varies from 30 to 60 per cent of the total area of the grate. It must be remembered that this space is only available for the air to go through when the grate is entirely clean. Most grates are seldom clean and many of the air spaces are filled even after the cleaning of the fires is completed. Ashes prevent sufficient air

from going into the grate, and in burning bituminous coal, the fire must be continually agitated in some way to allow air to go through to give good combustion. With a self cleaning grate it is possible to obtain a full supply of air. Seldom more than 50 per cent of the air needed for good combustion can be obtained through the fire bed. There must be some provision for furnishing air to the upper chamber. This is generally accomplished through holes in the fire door, when natural draft is used. There are also methods of furnishing air through the fire walls from the ash pan. Such methods, however, are not in common use. Many boilers are equipped with some type of forced or induced draft.

For the ordinary grate, with limited air space, the best method of firing is to carry a low bed of coals and to do frequent firing. If a certain amount of coal were to be thrown onto a fire every fifteen minutes, and a slice bar used to stir the fire to keep it burning, better combustion would result if about one-third of the coal used in fifteen minute periods were put on every five minutes. Heavy firing at long intervals produces too much carbon monoxide while light firing at short intervals produces more carbon dioxide.

In light firing more so than in heavy firing of coal, close attention must be given to prevent holes burning through the fires. When such holes are burnt through the fire a draft of air is created that goes through the combustion chambers and is not used for combustion but only carries heat out through the stack. With a number of such air holes, the temperature of the fire may be reduced as much as 500 degrees, which means a great loss of heat units and correspondingly high stack temperatures. When holes do occur through a fire green coal should not be thrown into these holes as this deadens and banks the fire producing carbon monoxide combustion at those places. An evener should be used to spread the hot coal over the grate, and the green coal should then be thrown over the bed of hot coal. If holes are being continuously burnt through a fire bed, it is evidence that clinkers are forming over the grate and they should be broken up, and if possible, passed through the grate. The clinkers should be broken up at least until the fire can be cleaned.

Cleaning fires on certain types of grates should be done at regular and sometimes frequent intervals. It should be remembered that the cleaning of fires means a waste of steam and coal. Much good coke is lost and the steam pressure is bound to be lowered. Fire cleaning should be done, whenever possible, when the load is light on the boiler or after working hours. If it must be done while the load is being carried on the boilers, then a heavy fire should be carried on one side and a light fire on the other. As the light side burns down it should be cleaned. All clinkers and ashes should be pulled so that the grate is absolutely clean. Then the fire from the other side should be spread over the clean side, and after that side of the fire is built up, the other side should be cleaned and the fire again spread and built up.

With a grate that is self cleaning, it is not necessary to fight a fire to keep up the steam pressure for hours, waiting for an opportunity to clean the grates. A self cleaning grate will also give the full volume of air that is intended to go through for consumption at all times. Another advantage of a self cleaning grate is that the back of the grate can be kept free from the ashes. It is comparatively easy to keep the front of the grate clean but the rear end becomes foul with ashes with the result that little air can get through and combustion is poor. The rear of a grate should be kept clean. Stokers are an advantage as there is generally a dump section in the grate so that the grate can be kept clean by dumping.

A greater depth of fire can be carried on grates that have a larger per cent of air going through them than those with less air and the periods of firing can be longer. One of the advantages of forced draft systems is that a heavy fire can be carried and enough water evaporation obtained to carry an over-rating on the boiler.

Every boiler should have a self regulating damper and it is the fireman's duty to set this damper to suit different kinds of weather and loads on his boiler. Much coal is wasted through poor regulation of the damper. With a balanced draft system the damper is regulated with the draft. The best results are thus obtained.

I've used it like a steam shovel and haven't stopped it yet!

The man who said that operates a quarry, builds roads, has a sand and gravel bank—and uses the

Haiss Creeper Truck Loader

on every loading job he comes up against. It's brutal use for a Loader but the machine is right there. We saw it last digging a new road in to the gravel pit—making a cut through a 12-15 foot bank. Before that it was loading the fine stone dust spoil that had accumulated in years of crusher plant operation—hard, cemented together, a tough job for any machine. All that is typical Haiss Loader service. You hear it from all over—"You ought to see my Haiss Machine dig." And operators have finally gotten wise to the fact that a Haiss Loader is not merely a stock-pile machine, but a flexible piece of equipment.

It's so good because it is different.

Haiss Feeding Propellers
Slow-Speed Crowding Drive
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Easily Adjustable Elevator
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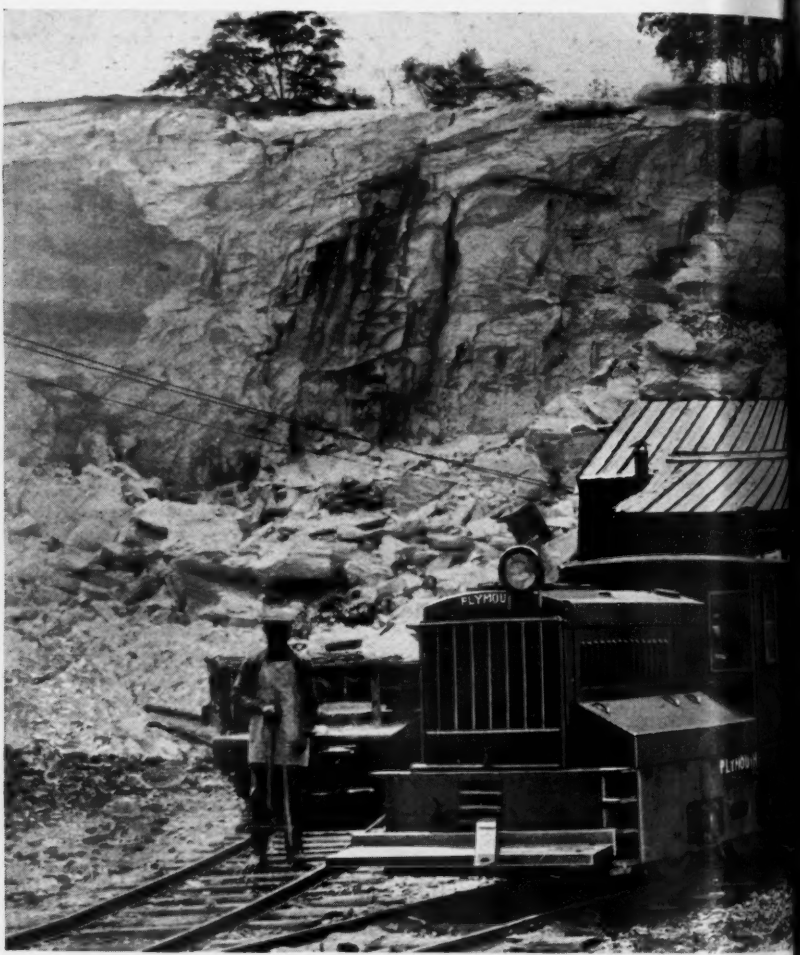
Simple Controls
All-Steel Construction
Haiss Creeper Treads
3 point Suspension

Ask for Catalog 523 and see for yourself.

The Ideal Machine for the Small Sand and Gravel Operator

The George Haiss Manufacturing Co., Inc.
142d St. & Rider Ave.
NEW YORK, N. Y.



INDUSTRIA CT

PIT—A natural or artificial hole or cavity in the ground, especially when relatively wide and deep.

QUARRY—An excavation from which stone is taken for building or other purposes. Distinguished from mine by being widely open at top.

PLYMOUTH—An industrial locomotive manufactured at P mouth, Ohio, and distinguished its sturdy construction, its l life, and matchless service. Es cially adapted to pit and qua industries.

HAULAGE—An industrial pr lem especially acute under pres

ditions
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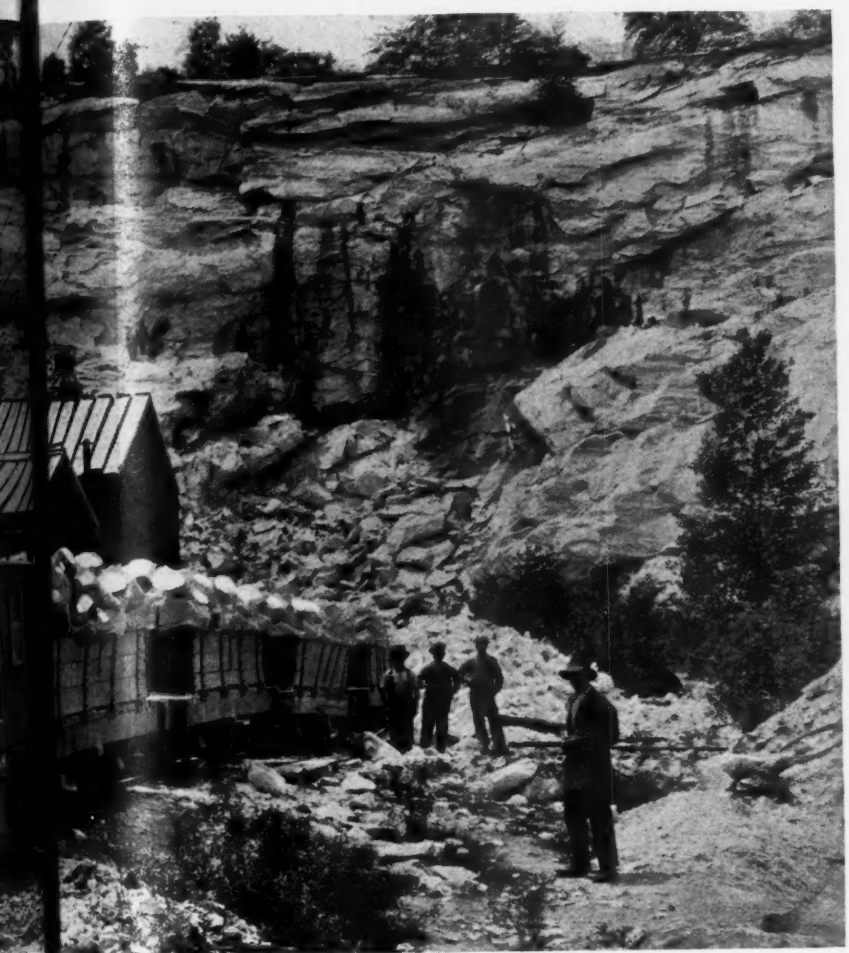
Gasoline PLYM



ICTIONARY

at P ditions, but easily solved by the uished allation of a Plymouth Gasoline its l omotive.

ce. Es *ATISFACTION*—A feeling of nd qua xation and content, particu- y enjoyed by Pit and Quarry ers who have shifted the haul- trial pro burden to the Plymouth Gaso- er pres Locomotive.

RESEARCH—Digging after facts, particularly exemplified by those who write for Illustrated Bulletins on haulage issued by

The Fate-Root-Heath Co.
Plymouth Locomotive Works
PLYMOUTH, OHIO

MOUTH Locomotives

Now is the time to make Agstone

"Our Jumbo Junior Crusher has averaged 10 tons per hour reducing one man stone to fertilizer size. We have only adjusted the hammers out once and are going on our third season. Repairs are not to be considered. We now have a contract for 2500 tons and are making a success of the agstone business."

J. T. RUTHERFORD,
Louisiana, Mo.

"Williams crusher was installed to make limestone meal and is doing this very satisfactorily and our farmers are buying it in big quantities. By installing our Williams crusher we are able to send in $250 to $500 per week to the county treasurer from by-products from road stone."

FLOYD COUNTY QUARRY,
Rome, Ga.

Good prices for farm products have given the farmer the money for much needed agstone. Idle winter months will give him the time to spread it. Why not cash in on this business by converting your limestone screenings into profitable agricultural limestone.

Pulverizes Screenings or One Man Stone to Dust

The Williams "Jumbo Junior" hammer crusher takes any size rock up to 14" cubes and reduces it to dust in one operation. One "Jumbo Junior" installation paid for itself in 4 months at the quarry of Otto Orth, Webster Groves, Mo. By using coarser grates, the same machine makes unusually uniform macadam. Service records and complete data gladly sent, write us.

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Williams

PATENT CRUSHERS GRINDERS·SHREDDERS

The Alabastine Company of Canada Producing High Grade Lime

Two Modern Plants at Elora and Teeswater, Ontario, Canada. The Elora Plant Notable for Unusual Fireproof Construction

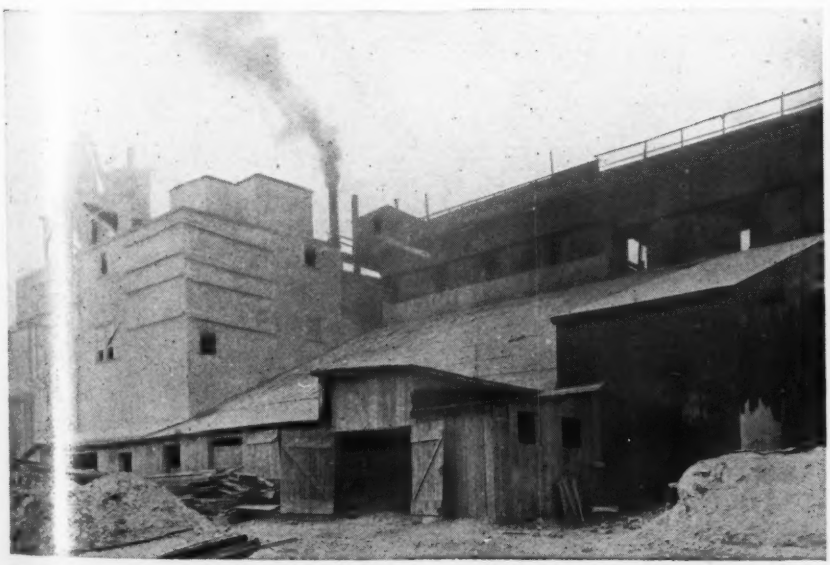
THE ruins of old lime kilns perched on hillsides and located along the banks of our rivers remind us, like the ancestral ruins of some old castle, that their uses are a thing of the past, and have been supplanted by the modern lime plants to which science, organization and invention have given the best equipment obtainable today, so that the industry can meet the ever-growing demand for more and better lime.

These picturesque ruins covered with weeds, bushes and grass serve not only to enchant the scenery by beautifying the side of the hills into which they were built, but give us a glimpse of the day when the lime industry of Canada was in its infancy, when the old time methods of manufacture as compared with modern methods look crude and primitive. But it must be remembered that those old methods served their day well and pioneered the way for greater industry that was to follow.

In building one of the old-time kilns, the side of a hill convenient to the location of the limestone was utilized. The next step was to procure the hardest heat-resisting rocks, granite if possible, to build it with. A space was then dug out of the hill and the kiln was built into this and up, until the top was on a level with the top of the hill so that a wagon or cart of limestone could be dumped into the top of the kiln. Another roadway came along the bottom of the hill where a fire door about four or five feet had been left. This fire door served also as an exit for the finished product when cooled.

After the limestone had been placed in the kiln, leaving a space about the same size as the door for a fire box, the limestone merely being arched to form this box, the firing proceeded and lasted anywhere from nine to fourteen days until every limestone was red-hot. It was then allowed to cool, care being taken to keep heavy rains from doing damage to the lime. An enormous amount of wood was consumed in the process.

Compare this old method with up-



A View of the Elora Mill Showing Construction Features.

A View of Quarry and Incline to Crusher House.

to-date time saving devices, machinery and equipment, illustrated here in the Elora Plant and quarry of the Alabastine Company, Paris, Limited.

The Alabastine Company's lime holdings comprise two plants, one at Elora, Ontario and one at Teeswater, Ontario, with the main office at Paris, Ontario.

The original plant at Elora was taken over by the Alabastine Company in 1914. It was a producing plant at that time with a capacity of about 75 tons a day. At the present time it has been built up to 125 tons capacity per day. The plant is located in the lime belt that extends through the counties of Wellington

A Quarry View of the Elora Plant.

and Bruce in considerable quantities.

The quality of rock is a good grade of high magnesium limestone and compares very favorably with the well known white rock deposits in Ohio.

Elora is so situated that it has a reasonably short haul to the centers of population in Ontario and Quebec, being on the Canadian Pacific Railroad and interswitching with the Canadian National Railway at Fergus.

The property lies conveniently on the side of the hill so that the plant being built in several stories, can be conveniently approached by the ground level. The quarry lies above the Grand River so that it can be readily drained by gravitation into the river.

The burning equipment consists of six kilns, two large ones and four smaller capacity, which can be seen in the illustrations.

The hydrating equipment comprises a Schaffer hydrator and poidometer for continuous and automatic weighing and hydrating the lime, a Raymond mill for pulverizing and an aerator for separating out the excess moisture, and a Bates valve bagging machine.

A large part of the production goes direct to Builders Supply Dealers in different towns and a certain amount to the Ontario Gypsum Company (associates of the Alabastine Company) at Caledonia where it is reshipped in mixed cars. This makes a very convenient arrangement.

The second plant is located at Teeswater, Bruce County, Ontario. The limestone here is softer, burns easier and has a lower magnesium content. The lime is pure white in color and very plastic. This is a smaller plant than the Elora plant having a capacity of two cars or 50 tons per day.

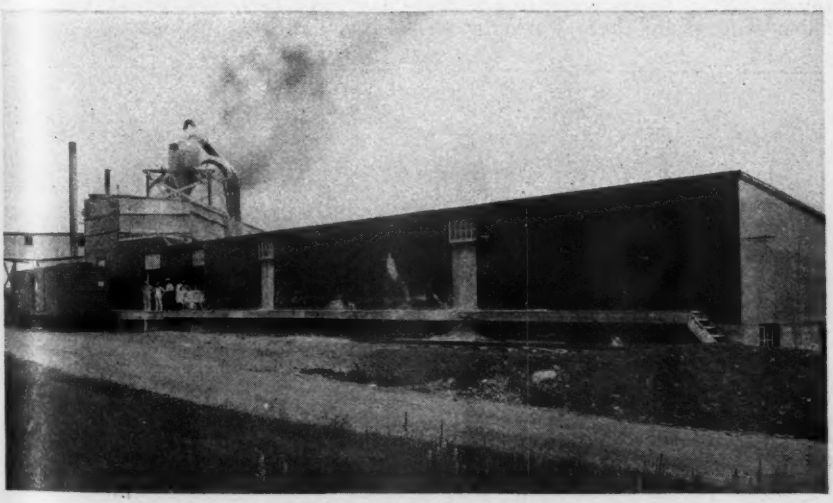
The equipment consists of three vertical kilns, a Clyde hydrator, Raymond pulverizer and Bates bagger, so that it is possible to produce a real hydrate product. It is generally recognized that hydrated lime made of this quality of rock gives a beautiful whiteness. Very plastic and easy spreading mortars made from this lime and further proofs of the quality of the rock.

The Teeswater plant was taken over by the Alabastine Company in 1921 and under the able management and highly effective sales organization, the Alabastine Company has built up a nice business.

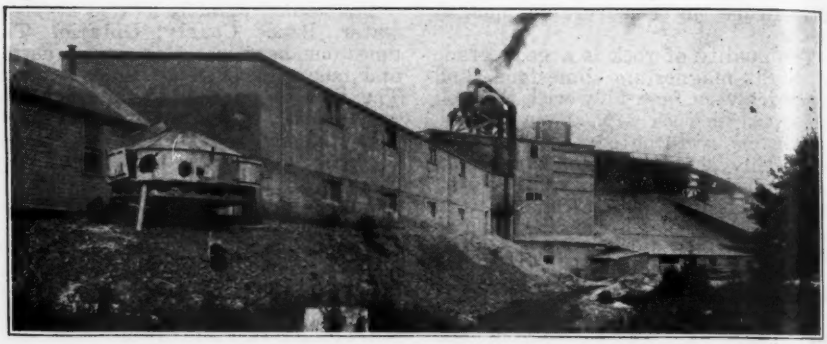
During 1920 the lime plant at Elora burned to the ground. The plant was immediately rebuilt. A fireproof building was erected on the site of the old building.

The main mill building and warehouses were built of wooden frame on concrete foundations. The frame inside and out was covered with gypsum plaster board and the roofs, floors, bins and every exposed part was also covered in the same manner.

The main building is approximately



A View of the Storage Warehouse.



A Close-Up of the Elora Mill.

50x50 feet and three stories high. The warehouse is 40x120 feet and two stories high.

The exterior walls were constructed with ⅜-inch gypsum plaster board nailed to the studding. Over this a heavy netting was stapled to the board. Then two coats of pulpstone hardwall plaster was applied and trowelled smooth. A waterproof oil paint was then applied.

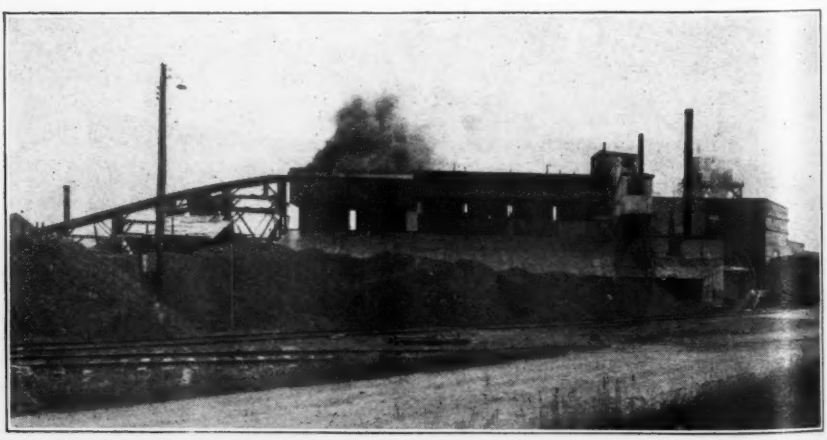
The roof was constructed in the same manner except that a built-up roofing was applied on top of the plaster.

The floors were built of ⅜-inch gypsum plaster board laid on top of the floor joists. Heavy reinforcing wire was then placed on top of the gypsum plaster board and the whole floor was given a 2-inch coat of pulpstone hardwall plaster and trowelled smooth. Steel filings were used in the finish coat where there would be occasion for heavy trucking. The bins were also built in the same manner. Plaster board was applied on the inside and outside and given a coat of hardwall plaster and trowelled smooth. All the exposed joists and beams were covered with plaster board and then plastered.

This construction has proved economical and very satisfactory. The exterior walls show no sign of deterioration and the floors are standing up well. The dead load during the winter in the warehouse averages 450 pounds per cubic foot.

The neatness of the plant, the absence of dust and the fireproofing features are outstanding characteristics of this plant.

A new gravel plant, producing 250 tons of washed sand and gravel per day, has been erected at Cleveland, Ohio, by F. E. Milligan.



Elora Mill Showing Incline and Kilns.

Cost Accounting in the Crushed Stone Industry

IV

Written expressly for PIT and QUARRY by D. J. HUTCHINSON

THIS is the fourth article on this subject written for PIT and QUARRY by Mr. Hutchinson. The series started with the September number. Accounting in its relation to selling prices, the application of uniform accounting methods and material as an element of cost; expense analysis and distribution; the principles and basis of expense distribution have been treated in the three articles preceding this one. Readers are invited to submit particular questions relating to cost methods to Mr. Hutchinson, care of PIT and QUARRY.—Editor.

IN the preceding article we described the methods of arriving at departmental costs by analyzing and distributing the various items of expense that enter into the conversion cost of crushed stone production. In this article we will illustrate the application of these methods to actual cost figures.

Labor Distribution

The first expense to be distributed is the pay roll, which we have seen is to be charged directly to the departments in which the labor is employed. The basis of this distribution is furnished by the time report, which must show the department where each man is employed and the nature of the work on which he is engaged, as operating, repair, construction, etc.

The exact form of time report is, of course, subject to modification to meet local conditions, such as the length of the pay period, the use of time clocks, etc. The form illustrated is for a handwritten record covering a semi-monthly pay period. It is designed to be printed on cheap light-weight manila stock, with a binding margin at the left punched to fit an inexpensive ring binder in which the cards are carried by the timekeeper. This helps to keep the cards clean, as pay roll records that are made up in the plant often get to the office in scarcely readable condition.

The first column shows the date and is arranged so that the same form can be used for both the first and second semi-monthly period. The form can be altered slightly to fit a weekly pay period. The time is expressed in hours and quarters, no cognizance being taken of periods of less than fifteen minutes. Thus, 9.2

D. J. Hutchinson.

means nine and two quarters or nine and one half hours.

The record is kept by the timekeeper and approved by the foreman when complete. It is then sent to the office where the rate is entered at the top of the card and the amount of pay figured. The cards are then posted to the Pay Roll Summary and Distribution record (figure 4), as will be seen by comparing item 3 in this form with the specimen time card. The Pay Roll Summary and Distribution record, as its name indicates, serves a double purpose, that of pay roll record and labor distribution. By thus combining these two records on one form, we make sure that all of the labor paid for is actually distributed to the departmental expense accounts or other accounts affected.

The first column shows the actual amount of pay due, and corresponds to the pay check or envelope. The second column shows any deductions for advances, purchases from stores,

A. B. C. STONE COMPANY

ANALYSIS OF EXPENSE ACCOUNTS

Month of July, 1924

	DEPARTMENTAL EXPENSES	1000 Stripping	1100 Drilling	1200 Blasting	1300 Quarry	1400 Mill	1500 Stock-piling	1600 Loading & Shipping	2000 Shovel	2100 Truck	2200 Power	2300 Floating Gang	2400 General Plant
01	Operating Labor	$150.00	$1,500.00	$ 250.00	$1,250.00	$ 600.00	$100.00	$ 500.00	$ 500.00	$225.00	$175.00	$1,500.00	$ 400.00
02	Operating Supplies	40.00	600.00	1,100.00	200.00	85.00	25.00	112.00	340.00	60.00	300.00	60.00	.....
03	Repair Labor	52.00	120.00	.....	125.00	100.00	10.00	45.00	120.00	12.00	30.00	.....	40.00
04	Repair Supplies	40.00	90.00	.....	75.00	50.00	2.00	15.00	45.00	5.00	10.00	.....	12.00
05	Foremen and Supervision	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300.00
06	Clerks and Timekeepers	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	180.00
07	Liability Insurance	10.77	87.16	13.45	73.98	37.66	5.92	29.32	33.36	12.75	11.03	80.70	22.06
08	First Aid and Welfare	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	160.00
09–14		....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	Miscellaneous Expense	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Total Dept. Expense	$292.77	$2,397.16	$1,363.45	$1,723.98	$ 872.66	$142.92	$ 701.32	$1,038.36	$314.75	$526.03	$1,640.70	$1,114.06
	FIXED CHARGES												
20	Depreciation	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$ 600.00
21	Insurance	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	250.00
22	Taxes	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.00
	Total Fixed Charges	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$ 900.00
	Total Dept. Expense and Fixed Charges	$292.77	$2,397.16	$1,363.45	$1,723.98	$ 872.66	$142.92	$ 701.32	$1,038.36	$314.75	$526.03	$1,640.70	$2,014.06
	DISTRIBUTED CHARGES												
30	Shovel	$296.85	$.....	$.....	$.....	$.....	$.....	$ 890.55	$.....	$.....	$.....	$.....	$.....
31	Truck	95.30	.....	.....	.....	.....	.....	285.91	.....	.....	.....	.....	.....
32	Power	....	.....	.....	115.68	462.73	.....	.....	.....	.....	.....	.....	.....
33	Floating Gang	250.54	.....	.....	1,210.94	.....	626.34	.....	.....	.....	.....	.....	.....
34	General Plant	44.31	447.12	76.53	372.60	179.25	30.21	149.04	149.04	66.46	52.38	447.12	
	Total Distributed Charges	$687.00	$ 447.12	$ 76.53	$1,699.22	$ 641.98	$656.55	$1,325.50	$ 149.04	$ 66.46	5 52.38	$ 447.12	
	Total Operating Expenses	$979.77	$2,844.28	$1,439.98	$3,423.20	$1,514.64	$799.47	$2,026.82	$1,187.40	$381.21	$578.41	$2,087.82	
	DISTRIBUTION CREDITS												
1000	Stripping	....	.....	.....	.....	.....	.....	.....	$ 296.85	$ 95.30	$.....	$ 250.54	$ 44.31
1100	Drilling	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	447.12
1200	Blasting	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76.53
1300	Quarry	....	.....	.....	.....	.....	.....	.....	.....	.....	115.68	1,210.94	372.60
1400	Mill	....	.....	.....	.....	.....	.....	.....	.....	.....	462.73	.....	179.25
1500	Stockpiling	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	626.34	30.21
1600	Loading and Shipping	....	.....	.....	.....	.....	.....	.....	890.55	285.91	.....	.....	149.04
2000	Shovel	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	149.04
2100	Truck	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66.46
2200	Power	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52.38
2300	Floating Gang	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	447.12
	Total Distribution Credits	....	.....	.....	.....	.....	.....	.....	$1,187.40	$381.21	$578.41	$2,087.82	$2,014.06

SEMI MONTHLY TIME REPORT

NAME John Smith No 3

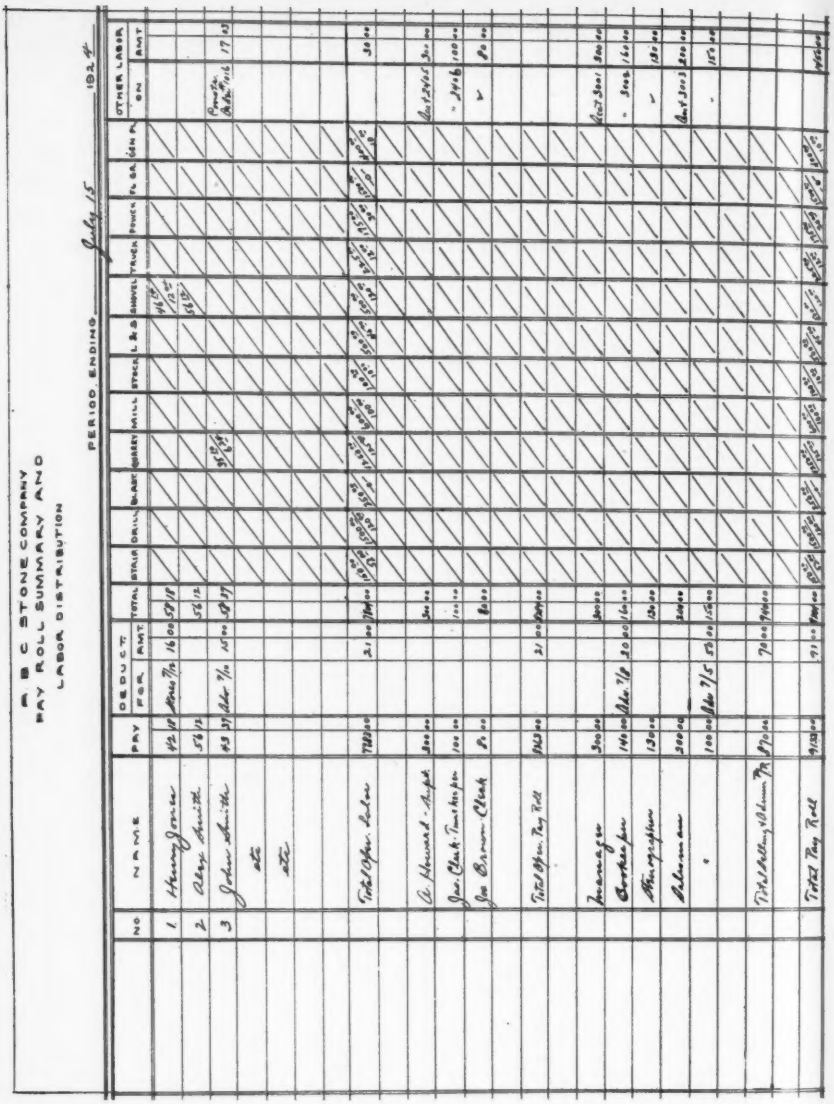
RATE .52 PERIOD ENDING 7/15/24

	DATE		TOTAL HOURS		OPER.		REP.		OTHER LABOR EXPLANATION	HOURS		
	1	16	9	2	8	0	1	2				1300
	2	17	9	1	9	1						✓
	3	18	9	2	6	0	3	2				✓
	4	19	9	2					Levee Const. Order # 1016	9	2	
	5	20	4	2					✓	4	2	
	6	21										
	7	22	9	2					✓	9	2	
	8	23	9	1					✓	9	1	
	9	24	9	0	9	0						1300
	10	25	9	2	9	2						✓
	11	26	9	2	5	0	4	2				✓
	12	27	4	2	4	2						✓
	13	28										
	14	29	9	2	7	0	2	2				✓
	15	30	9	1	9	1						✓
	-	31										
	TOTAL HOURS		112	1	67	2	12	0		32	3	
	AMOUNT		58	37	35	10	6	24		17	03	

RECEIVED PAYMENT

TIMEKEEPER FOREMAN

etc., and the amount thereof. The deductions added to the amount of pay shown in the first column equal the amount of pay earned as shown on the time card which is entered in the third column headed "Total." The departmental charges as shown by the time cards are then distributed to the appropriate columns, and any other labor entered in the last column with appropriate explanation. Operating labor is entered above, and repair labor below, the diagonal line in the departmental columns. This



device saves space and materially reduces the size of the form. The distribution columns are then totalled and cross totalled to check with the total column.

From the Pay Roll Summary and Distribution the labor charges are entered in the Analysis of Expense Accounts. This form, it will be noted, corresponds to the Chart of Expense Accounts, except that the amounts are shown in place of the account number. For convenience in illustrating how the labor charge is transferred from the Pay Roll Summary to the Expense Analysis, we have used the labor figures for the first two weeks as though they represented the pay roll for the entire month, so that the figures on the two sheets would agree. Actually, of course, the totals for both first and second pay periods would be combined.

After the labor is distributed we are in a position to distribute the Liability Insurance which is dependent on the labor distribution.

This is determined by applying the liability insurance rate to the departmental pay rolls as follows:

Dept. No.	Name	Oper.	Labor Repair	Total	Liab. Ins. at $5.38 per C	Charge Acct.
1000	Stripping	$ 150.00	$ 52.00	$ 202.00	$ 10.77	1007
1100	Drilling	1,500.00	120.00	1,620.00	87.16	1107
1200	Blasting	250.00	.....	250.00	13.45	1207
1300	Quarry	1,250.00	125.00	1,375.00	73.98	1307
1400	Mill	600.00	100.00	700.00	37.66	1407
1500	Stockpiling	100.00	10.00	110.00	5.92	1507
1600	Loading & Ship.	500.00	45.00	545.00	29.32	1607
2000	Shovel	500.00	120.00	620.00	33.36	2007
2100	Truck	225.00	12.00	237.00	12.75	2107
2200	Power	175.00	30.00	205.00	11.03	2207
2300	Float. Gang	1,500.00	.....	1,500.00	80.70	2307
2400	Gen. Pl.	400.00	10.00	410.00	22.06	2407
	Totals	$7,150.00	$624.00	$7,774.00	$418.16	

The amounts thus determined are transferred to the line and column on the Analysis of Expense Accounts representing the departmental liability insurance account.

The materials used from stores are reported on material requisitions and summarized in the same manner as the time reports and the summary totals carried to the expense analysis sheet. Materials charged to operations when purchased are summarized from the cash book or purchase record, as will be explained in the next article and included in the summary posted to the expense analysis.

The fixed charges as their name indicates run approximately the same from month to month, and schedules can be prepared that will furnish the monthly journal entry for these items. Such schedules must be changed, of course, whenever there are changes in the property accounts. The detail of the journal entries is then entered on the expense analysis.

After completing the direct distribution of the departmental expenses and fixed charges, these items are totalled and the distributed charges calculated and applied according to the methods previously outlined. The first indirect department to be closed out is the General Plant which is to be distributed to the other departments on the basis of the ratio of the operating labor in each to the total operating labor. In determining this ratio, the General Plant department is, of course, omitted, and the percentages for the distribution of the General Plant expense are obtained as follows:

Dept. No.	Name	Oper. Labor	Per Cent	Gen. Pl. Expense	Charge Account
1000	Stripping	$ 150.00	2.2	$ 44.31	1034
1100	Drilling	1,500.00	22.2	447.12	1134
1200	Blasting	250.00	3.8	76.53	1234
1300	Quarry	1,250.00	18.5	372.60	1334
1400	Mill	600.00	8.9	179.25	1434
1500	Stockpiling	100.00	1.5	30.21	1534
1600	Load. & Ship.....	500.00	7.4	149.04	1634
2000	Shovel	500.00	7.4	149.04	2034
2100	Truck	225.00	3.3	66.46	2134
2200	Power	175.00	2.6	52.38	2234
2300	Float. Gang	1,500.00	22.2	447.12	2334
	Totals	$6,750.00	100.0	$2,014.06	

The Floating Gang charges are distributed to the departments in which the Floating Gang has been employed, as shown by the foreman's time report which we will assume is as follows:

Dept. No.	Name	Hours	Per Cent	Fl. Gang Expense	Charge Account
1000	Stripping	28.2	12.0	$ 250.54	1033
1300	Quarry	66.4	58.0	1,210.94	1333
1500	Stockpiling	21.0	30.0	626.34	1533
	Totals	115.6	100.0	$2,087.82	

The power department costs are distributed on the basis of power consumption as determined by meter or by the rated capacity of the machinery and equipment, from which we will assume that 80 per cent of the power is used in the mill and 20 per cent in the quarry. Thus the power distribution is obtained as follows:

Dept. No.	Name	Per cent of Power Used
1300	Quarry	20
1400	Mill	80
	Total	

The Shovel and Truck costs are distributed to the operating departments on the basis of the time the shovels and trucks are used by each as shown by the shovel engineer's and truck driver's time reports, from which the distribution of these items is obtained as follows:

Dept. No.	Name	Hours
1000	Stripping	28.4
1600	Load. & Ship.....	85.2
	Total	114.2

Dept. No.	Name	Hours
1000	Stripping	26.3
1600	Load. & Shipping....	81.2
	Total	108.1

After completing the redistribution of the Indirect Department costs, we can find the total monthly operating expenses for the Direct Department by adding the distributed charges to the departmental expenses.

Before determining the operating costs for the month, however, it is necessary to adjust the stripping account. The amount of $2,536.40 represents the stripping expense for the current month, but it does not necessarily represent the stripping cost of the stone produced during the current month, since stripping is ordinarily carried on in advance of production. Therefore, the actual stripping expense is deferred and a monthly charge is made of a certain amount per cubic yard on the stone produced, the rate being determined by dividing the total stripping expense by the amount of stone uncovered. For practical purposes it is better to use an average rate rather than to attempt to apply the actual stripping of each area uncovered to the stone actually produced from that area. The deferred stripping expense is, therefore, in the nature of a running inventory which is charged out at an average cost.

Before closing out the operating expense accounts, therefore, and setting up the cost of sales, it is necessary to make a journal entry adjusting the stripping accounts as follows:

Deferred Stripping Expense..$979.77
Operating Expense Control to $979.77

Power Dept. Expense	Charge Account
$115.68	1332
462.73	1432
$578.41	

To charge out stripping expense for the month of July, 1924, 40,000 yards of stone uncovered, cost $979.77, or $ .0245 per yard.

Assuming that the deferred stripping expense account at July 1 represented 20,000 yards of stone uncovered at an average cost of $ .0196 per yard, the average at July 31 would be obtained as follows:

Per Cent	Truck Dept. Expense	Charge Account
25.0	$ 95.30	1031
75.0	285.91	1631
	$381.21	

Per Cent	Shovel Dept. Expense	Charge Account
25.0	$ 296.85	1030
75.0	890.55	1630
100.0	$1,187.40	

20,000 yds.@ .0196=$ 392.00
40,000 yds.@ .0245= 980.00
60,000 yds. cost =$1,372.00=.0229 (per yd.)

That is the "weighted" average is to be obtained, and applied to the current month's production to obtain the stripping cost for the month. Assuming the production for July to be 25,000 yards, the stripping charge will be 25,000x .0229 or $572.50.

The final cost figures for July will be obtained from the Expense Analysis as follows:

	Cost	Per Yd.
Drilling	$ 2,844.28	.1138
Blasting	1,439.98	.0576
Quarry	3,423.20	.1369
Mill	1,514.64	.0606
Stockpiling	799.47	.0320
Load. & Ship ..	2,026.82	.0810
Total	$12,048.39	.4819
Royalty	$ 1,250.00	.0500
Stripping	572.50	.0229
Total cost ...	$13,870.89	.5548

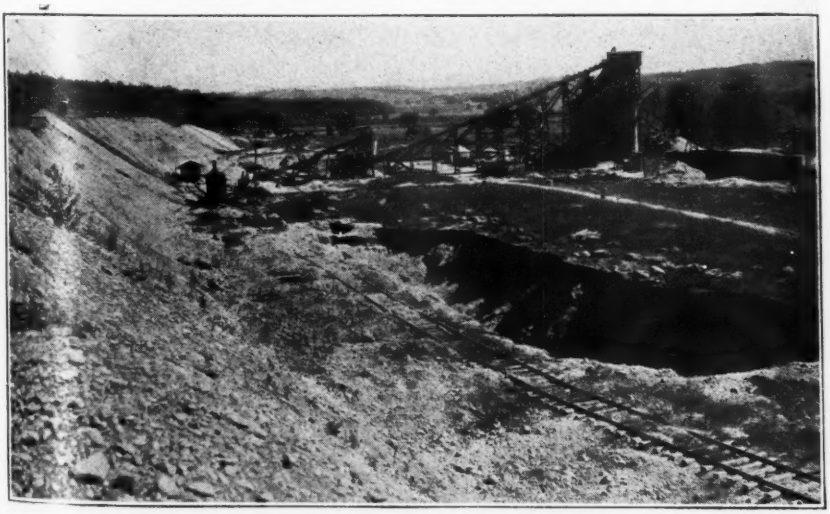
The New Sand and Gravel Plant Built at Franklinville, N. Y.

The J. E. Carroll Sand Company Working Deposit of 200 Acres. Little Stripping Necessary. Open Face Bank 2000 Feet Long

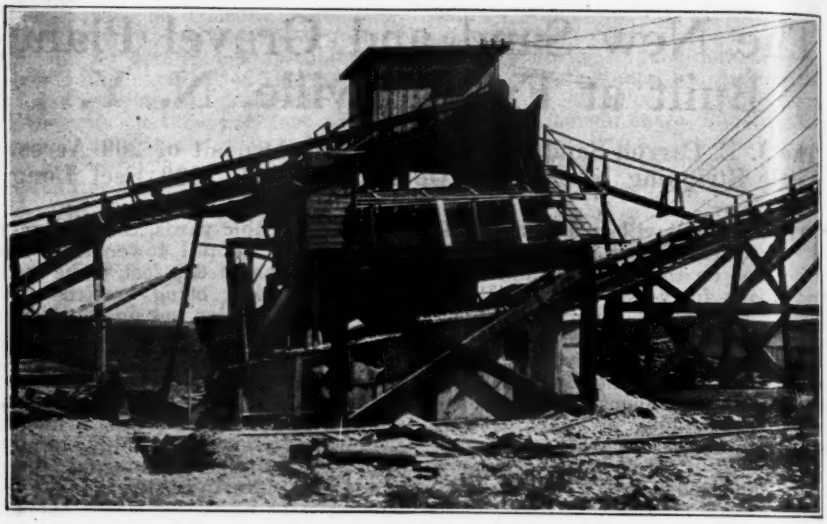
THE Franklinville plant of the J. E. Carroll Sand Company is located on the Pennsylvania Railroad about forty-five miles south of Buffalo and about thirty-five miles north of the boundary line dividing the states of New York and Pennsylvania. It is on the Buffalo-Olean State Highway, about half way between the villages of Machias and Franklinville, New York.

The J. E. Carroll Sand Company owns about 200 acres of gravel land with a depth of about 120 feet with 60 feet of this deposit below the datum plane, base of rail, of the plant and the remaining 60 feet above the datum plane with an open face bank approximately 2,000 feet long. There is practically no stripping to be done. The material grades about 60 per cent gravel and 40 per cent sand, very few of the boulders exceeding 8 inches in diameter.

A general layout of the plant is shown in the illustrations. As will be noted in these illustrations, the material is excavated at the present time by a Sauerman slack line cableway the bucket of which has a capacity of 2 cubic yards, the maximum distance of the tail tower from the mast being about 650 feet. The mast is 64 feet high, being erected on a concrete foundation set on the top of the bank, the top of the mast being 110 feet higher than the receiving hopper. The foundation is slotted to receive the shoe of the mast so as to allow the mast to be moved about 20 feet with adjustments only in the cables. The tail tower is on rollers and fastened to the bridle cable permitting it to be shifted about 50 feet without changing the bridle cable anchors. The Thomas hoist operating the cableway is powered by a 200 H.P. motor. This is also on top of the bank in a double deck cabin which gives the operator a view of the entire digging operation. It has been found that the two yard slack line cableway will not give sufficient tonnage to supply the demand. It is the intention of the J. E. Carroll Sand Company to install an electric shovel in the early spring with a 1¾ yard or a 2 yard dipper. At present a 10-ton Browning crane has been used to some extent to facilitate excavation of the



View Showing General Layout of Plant.

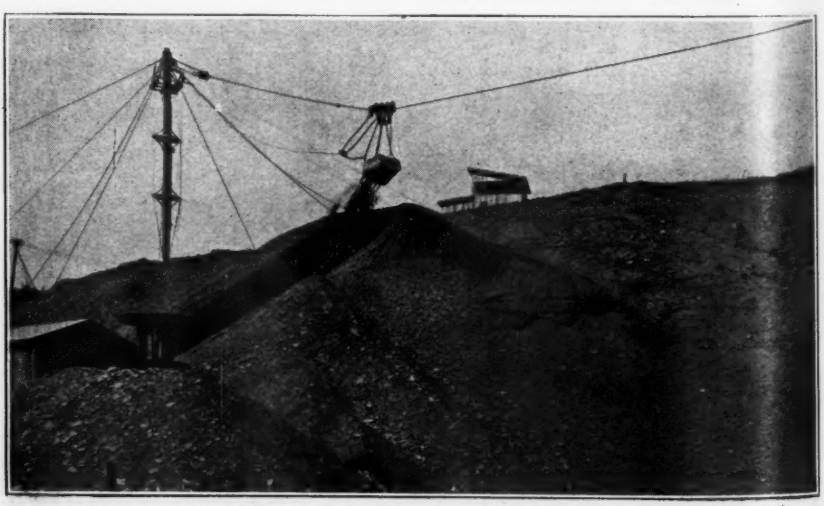


A View of Conveyors to Scalping Screen.

material. It has been found impractical to operate a clam shell in this heavy material efficiently.

The receiving hopper, a reinforced concrete structure 20 feet square and 20 feet deep, is situated at the foot of the open face bank, the face of the bank forming a natural extension for the hopper and acting as a cushion for the dump of the contents of the cableway bucket. The top of the hopper is divided into two compartments, the rear or bank side to receive the material from the cableway bucket and the front or plant side to receive material from side dump cars. Both of these compartments feed on a pan conveyor feeder in the lower part of the hopper which in turn delivers material to the belt. This feeder has a capacity of about 200 tons per hour and can be entirely shut off by means of a quadrant gate.

From the hopper to the scalping house a 30-inch belt conveyor operates on 135 feet centers, at an angle

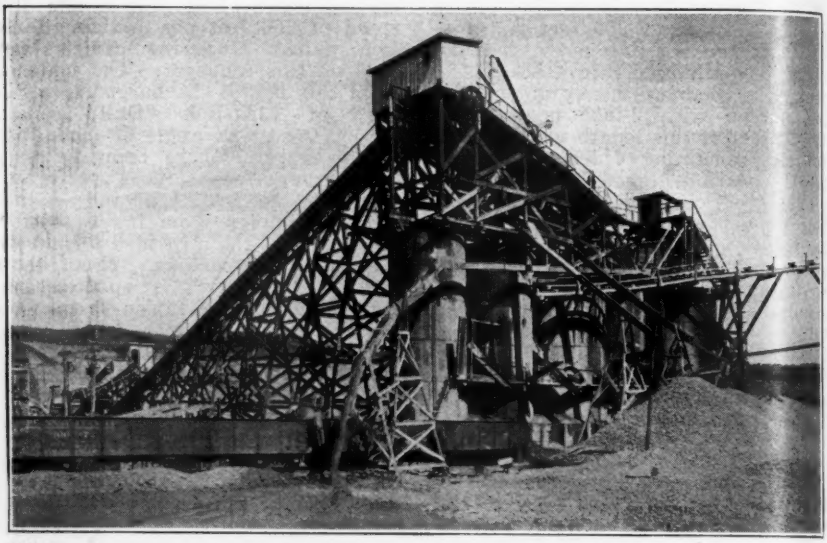


The Cableway Bucket and Hoist House.

of 18 degrees 30 minutes inclination and at a speed of 250 feet per minute. At the scalping house the material is discharged into a 48-inch 16 feet Allis-Chalmers heavy duty scalping screen with 2-inch perforations for 12 feet of this length and 2¾-inch for the remaining 4 feet. The material passing through the 2-inch rings is discharged directly on the belt conveyor to the washing plant. By means of a flop gate the material going through the 2¾-inch rings may be discharged on the same belt or into a number 4 Gates crusher, and the tailings are discharged into a number 5 Gates crusher. The product of the two crushers, 2-inch and under, falls on a 20-inch belt conveyor operating on 55 feet centers, at an inclination of 15 degrees and a speed of 200 feet per minute, and is hoppered from this conveyor to the conveyor from the receiving hopper and sent back to the scalping screen.

The conveyor from the scalping house to the washing plant is 30-inch belt, operating on 195 feet centers at an inclination of 20 degrees and at a speed of 250 feet per minute. Link-Belt uniroll troughing carriers are used on this conveyor. The material from this belt is discharged into two lines of Link-Belt "Dull" conical screens set at an angle of inclination of 16 degrees, there being in each line three 8-feet screens perforated with 1½-inch, $\frac{9}{16}$-inch and $\frac{5}{16}$-inch square openings from top to bottom respectively, and provided with rolls to clear the openings. From these screens the gravel is spouted into three steel storage tanks directly below, or into a hopper which feeds such gravel on the 24-inch conveyor operating on 160 feet centers at an inclination of 7 degrees and a speed of 200 feet per minute, delivering the gravel to storage piles below to be reclaimed by crane or shovel. It has been found that these two sets of screens, of three each in a row, do not supply the required output. During the winter another pair of screens will be installed making each set on a shaft consist of 4 screens. The

Another Plant View Showing Conveyor Scheme.

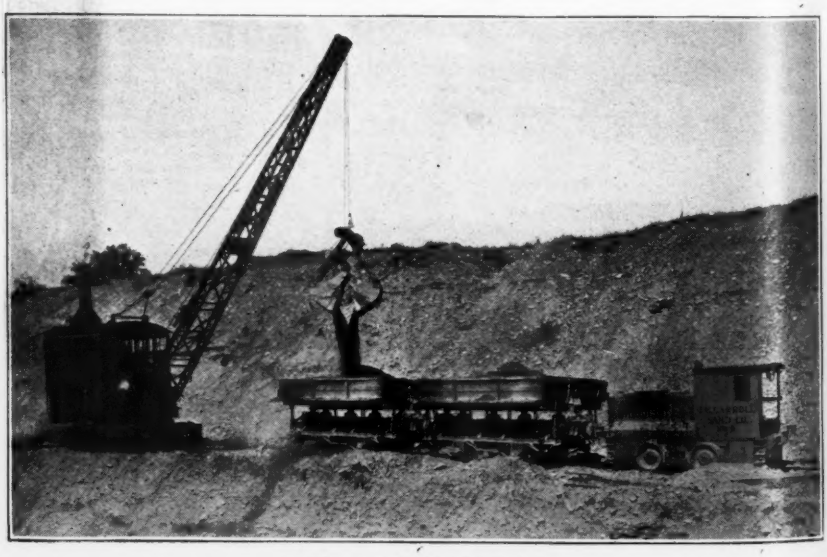


A General View of the Storage Tanks.

screens are the largest size manufactured by the Link-Belt Company.

The sand from the $\frac{5}{16}$-inch square opening is carried into two separate tanks 20 feet long, 4 feet 6 inches wide, and 3 feet 6 inches deep through which transverse paddles 4 feet long and 7 inches wide are continually being operated in a longitudinal direction by means of 2 roller chains. These chains are made of manganese steel furnished by the American Manganese Steel Company. These washing and dewatering tanks are so arranged that a mixed sand product or a coarse and a fine sand can be obtained. The coarse and the fine sand are dropped directly into steel storage tanks below each unit.

The five storage tanks are con-



A View of the Pit Operation.

structed of steel, three of which are 20 feet in diameter and 30 feet high and two 35 feet high. It is the intention to increase the height of these two tanks during the coming winter for larger storage. These tanks are placed on a concrete foundation the top of which is 8 feet above the rail. The tanks are equipped with a single loading spout on each side to load directly into cars. They are further equipped with Siamese spouts between tanks in order to give a mixed product of two kinds of gravel or a mix of sand and gravel directly from the tanks into cars. These spouts are furnished by the Link-Belt Company.

The plant will be served by a switch on both sides of the bins, these switches having a trackage to contain each 30 cars back of the plant or 60 cars for loading. The loaded cars will move to a point 250 feet east of the plant where they will be merged into the one switch, then over the scale, then from the scale eastward toward the mainline on two tracks with sufficient storage capacity for 60 loaded cars. Provision has also been made to load trucks from the north side of the bins.

At present the water is supplied to the plant from a well 50 feet west of the storage tanks. The well was excavated by sinking an open concrete caisson about 10 feet square, interior dimensions. It was sunk to a depth of about 65 feet below the base of the rail. In the bottom of this well a steel cylinder, 6 feet in diameter and 22 feet long with slots ½-inch by 12 inches in the sides was sunk into the water bearing gravel. The suction pipe from the pump extends into this steel enclosed well. The water is pumped by an Allis-Chalmers 6 inch centrifugal pump directly connected to a 60-H.P. motor, the unit being seated about 35 feet below the base of the rail. From the pump the water is carried to the top of the plant in a 10-inch pipe, the vertical distance being approximately 100 feet. At the top of the plant three 4-inch branches are taken off, one to the head pulley or belt conveyor and one to each line of screens, there being two 2-inch sprays in each screen.

The power is delivered by Niagara, Lockport and Ontario Power Company at 2 phase 60 cycle, 23,000 volts and is transformed down to 440 volts for plant use. The motors are all squirrel cage 1,200 R.P.M. and with exception of the crushers are all geared directly to the machine units. The crushers are belt driven. All of the motors driving the conveyors are under remote control. For example, the belt conveyor from the receiving hopper to the scalping house may be stopped by a push button either at the hopper or at the scalping house.

A Plant View From a Distance.

All motors were furnished by the Allis-Chalmers Company.

The side dump cars of 6-yard capacity were furnished by the Arthur Koppel Company of Koppel, Pennsylvania. They are operated by a 7-ton standard gauge Plymouth gasoline locomotive with a shift gear. This locomotive has ample power to carry the four 6-yard hoppers from different parts of the bank to the receiving hopper.

The plant was designed and constructed under the supervision of Mr. Elwin G. Speyer, Engineer for the J. E. Carroll Sand Company with the assistance of Mr. J. E. Carroll. Construction was begun December 1st, 1923, and the plant was put into operation about the middle of June, 1924.

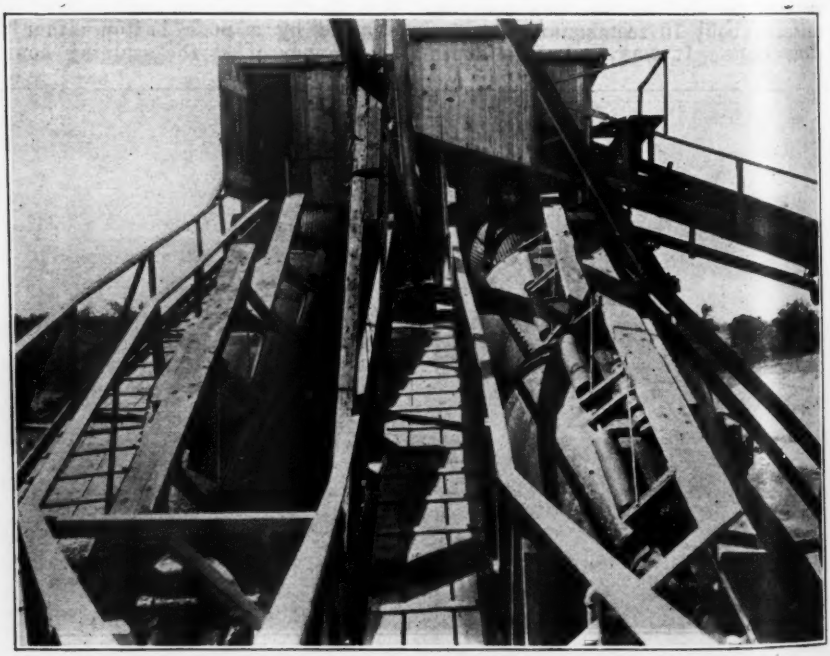
Buchanan Type "C" Crushers

Bulletin No. 110, on all steel crushers, just issued by C. G. Buchanan Company, Inc., 90 West St., New York City, is offered with the statement that it contains more practical information regarding details of construction, care, management and adjustment of this class of machinery than is found in many catalogs.

"In large quarrying and mining operations the methods employed in rock and ore handling have, in the last two decades, undergone radical changes," says the Foreword. "Large masses of rock, weighing from two to five tons or more, are now handled by the modern steam shovel and loaded directly into special side or end dump cars, which are conveyed to the crushing plant and dumped directly into the jaws of large preliminary breakers."

The first all-steel sectional jaw breaker built, they say, was a Buchanan Type "C" Crusher, in 1908, and this machine has given 16 years of unfailingly satisfactory service. The catalog describes the modern model "C" Crusher in detail, with illustrations and diagrams. Copies and full information mailed on request.

Prices of sand, gravel, crushed stone and associated materials in the Boston market show a tendency to advance, and during the past fortnight both gravel and crushed stone have found higher levels. The call for stocks is good, and a sizable volume of construction is going forward in this district.



The "Dull" Conical Screens.

Ontario Gypsum Company Limited Operates Two Mills in Canada

Plants Located at Caledonia and Lythmore, Ont., Can. Effective Sales Organization-Management Built Business

THE Ontario Gypsum Company Limited of Paris, Ontario, is operating two gypsum mills that supply practically all the gypsum to the province of Ontario, Canada.

The plant at Caledonia is situated on the Canadian National Railway fourteen miles west of Hamilton, Ontario, and fifty-two miles west of Toronto. This location offers splendid freight rates to points as far west as Port Arthur and as far east as Quebec City.

The mining operations are carried out under practically ideal conditions. Gypsum is obtained at an approximate depth of eighty feet. The entrance and exit are by a drift located very near the mill building.

The company is now mining an 8-foot seam of grey gypsum 70 feet below the surface. The mining is done by what is known as the long pillar system. Jeffrey rotary electric drills are used exclusively. The rock after blasting is loaded by hand into 10 ton mine cars and drawn by mules to an incline shaft. Here it is weighed and hoisted to the surface and into the mill.

The rock is dumped from the hoist directly into a Butterworth and Lower jaw crusher and from this crusher the stone is discharged into a Butterworth and Lowe rotary crusher.

At this point part of the gypsum is separated and conveyed to box cars for shipment to cement plants. The balance is conveyed to a large capacity storage bin that feeds a French dryer.

This dryer was installed at a considerable cost. The plans of the dryer were purchased in France and the castings made in Canada. The dryer removes all the surplus moisture with a minimum amount of fuel and has the effect of greatly increasing the kettle capacity. The French use this dryer for calcining but the Ontario Gypsum Company use it for drying only.

The dryer discharges into a Pennsylvania hammer mill where the gypsum rock is further reduced. From the hammer mill the material is conveyed to tanks over two calcining kettles. The kettles are large Butterworth and Lowe kettles and they discharge from 16 to 18 tons each at one dumping. Before going to the tanks the material passes a screen and the coarse particles are conveyed back to the Pennsylvania hammer mill.

The Caledonia Mill of the Ontario Gypsum Company.

A View of the Mill Showing Storage Facilities.

The hot pit stucco is put through a Raymond mill for further grinding and then it is passed through a tube mill that makes the plastic plaster. The patented process of Warren D. Emley is used in making plastic gypsum. The warehouse gypsum board and gypsum block plant are supplied from this mill.

The whole plant is modern in every respect and an excellent high grade hardwall plaster is manufactured from a very ordinary grade of raw rock.

The products of the Caledonia mill are hardwall plaster, plaster of paris, land plaster, gypsum block, gypsum board and gypsum fireproof wall board.

The wall board mill is also modern in every detail. At the present time the capacity is being doubled.

The Ebsary Gypsum Company Limited have their plant adjacent to the Caledonia Mill of the Ontario Gypsum Company Limited and they secure their stucco from the Ontario Gypsum Company and make gypsum block at their own plant.

At Lythmore, nine miles from Caledonia, the Ontario Gypsum Company have a deposit on three different levels—30, 60 and 120 feet from the surface. The mining is handled the same as at Caledonia except that hauling is by electric locomotive. The rock is hoisted up a vertical shaft and dumped into a Butterworth and Lowe combination of crushers the same as at Caledonia.

An Example of Construction Using Gypsum.

From the crushers the rock goes through a Ruggles Cole dryer, Raymond mills and then to the calcining kettles. The hot pit stucco is then processed by a tube mill making it plastic before being conveyed to the warehouse.

All the power at the mills and in the mines is hydro-electric and supplied by the Hydro Electric Power Commission of Ontario. For the past two years the Lythmore mill has been practically closed down while the Company was putting down new shafts and drifts opening up a deposit of pure white gypsum. They anticipate that within the next two or three months they will be operating at Lythmore as well as at Caledonia.

The general superintendent is Mr. A. J. Parkhurst who has Mr. L. V. Robinson as assistant. Mr. Harry Bonnell is superintendent of the board mill and Mr. John Renwich is superintendent of the mine.

The president of the Ontario Gypsum Company is Mr. Case of Buffalo, N. Y. Mr. R. E. Haire is general manager and Mr. J. F. Cameron sales manager.

The company has advertised extensively and effectively until their products are known well and favorably all over the Dominion. The advertising coupled with the extremely aggressive sales methods have largely been responsible for the excellent business that has been built up. The dealer literature and dealer cooperation given by the sales department of this company is indeed excellent and most effective.

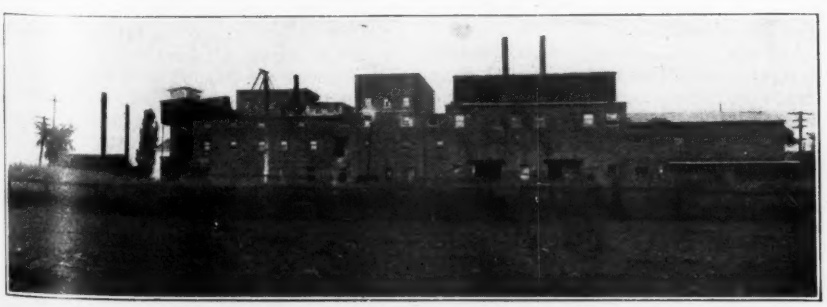
Cleveland Worm & Gear Company Moves

The Cleveland Worm & Gear Company, manufacturers of Worm Gearing for automotive purposes and Cleveland Worm Gear Speed Reducers for industrial purposes, are moving into their new plant this month, located on East 80th Street, south of Kinsman Avenue, Cleveland, Ohio. This plant is served by a switch from the Pennsylvania Railroad, and the first unit has been erected at an approximate cost of $200,000, of one story construction, monitor type, with steel sash wall design.

This change from the old address at 40th Street and Payne Avenue has been necessitated by increasing business. The company states it is the pioneer in the manufacture of Worm Gear Units in this country, and the only concern in the world devoting its entire resources to the exclusive manufacture of this type of Speed Reducer. Since their organization in 1912, they have supplied many thousands of worms and gears for the automotive industry, and many thousands of complete speed reduction units for industrial purposes.

In the pioneering of the business they have also found it necessary to build the special machinery for bobbing worms and generating gears. In addition to these machines, their plant will be an outstanding example of modern machine shop equipment and practice. The company has built up an engineering department possessing varied experience and high rank.

The officers of the Company are: A. H. Clark, President; Howard Dingle, vice-president and General Manager; M. L. Thomson, second vice-president; H. C. Robinson, treasurer; and A. C. Blair, secretary. Mr. Dingle is well known in American and Canadian engineering circles, and brings to the company a large resource of practical knowledge and experience.



A General View of the Mill.

Kentucky Breaks Records

Many Millions Voted for Road Building. A Report of the Asphalt Paving Congress Convention in Louisville.

By Our Louisville, Ky., Correspondent

THERE has been a noticeable revival in building operations since mid-summer and the result has been a corresponding increase in the demand for sand and gravel. September broke all previous records in the number and value of building permits, and the going has been equally good for the first half of October. This has given the river sand and gravel people here lots of local business in addition to the heavy volume of carlot business going to road jobs and building operations out through the state. So it has been unusually busy with the sand and gravel people.

Quarrymen have been busy, too, and there is every promise of continued steady work among the quarries till freezing weather interferes, probably up to the end of the year.

As President Arthur D. Allen, of the Kentucky Good Roads Association and the Louisville Board of Trade, said in addressing the Asphalt Paving Congress here October 13, we have a bond issue question in Kentucky that will play a part in road building. That is, Kentucky is to vote in November on a 75 million dollar bond issue, 50 million of which is for road work, and there is some division of opinion, so that the issue is still uncertain.

Meantime there is a fair measure of road building going on and Joe S. Boggs, State Highway Engineer, Frankfort, Ky., reports a number of new contracts to be let.

The Third Annual Asphalt Paving Congress Conference was held at the Brown Hotel, Louisville, Ky., under the auspices of the Asphalt Association, J. E. Pennybacker, general manager, October 13-14-15.

Among the interesting things brought out in the technical and practical discussions one was that limestone dust constitutes the best filler for asphalt. There was also some interesting discussion of gravel, both in the matter of size and character, and in addition to a rather elaborate business program some interesting social features.

The business program included papers dealing with sand asphalt pavements, the use of gravel both in foundation and in asphalt surfaces, and a discussion of the design and mix for Portland cement concrete foundations.

R. B. Tyler, who is active in road work as well as quarrying and crushing in connection with road contracts, and in asphalt surfacing, was an active participant in the Conference. He was Chairman of the Smoker Session held the night of October 13, and entertained the visiting delegates with an old fashioned Kentucky barbecue at his country residence the second day of the Congress.

Indiana Sand and Gravel Association Resumes Activities

THE annual meeting of the Indiana Sand and Gravel Association was held at Terre Haute, Ind., October 14th. At this meeting it was decided to re-establish the association on its former progressive basis, by again employing an executive secretary. The association will accordingly proceed to find and employ an efficient secretary who will carry on the promotional work mapped out by such able former secretaries as E. Guy Sutton and R. C. Yeoman. The plan is to find a technically educated man and a practical politician, such as the last secretary, Mr. Yeoman, was.

The necessity of taking an active part in shaping public works policy for the survival of the industry, in a system of representative government based on a theory of checks and balances, such as ours, was recognized by everyone. The Indiana Sand and Gravel Association has been drifting without an executive secretary since Mr. Yeoman resigned last year to become chief engineer and general manager of the Construction Materials Co., of Chicago. This condition has brought home to the membership the fact that a good live secretary is a prime essential in the maintenance of a progressive association.

Because of his particular acquaintance with this work, E. Guy Sutton, formerly and for some years, executive secretary of the Indiana and The National Sand & Gravel Associations, and now vice-president of the Carmichael Gravel Co., of Attica and Wolcottsville, Indiana, was elected president of the association for the new year.

Lee R. Witty was elected vice-president, and Jesse A. Shearer, treasurer.

Tennessee Arkansas Gravel Company Operates on Mississippi River

The Plant Capacity is 2000 Cubic Yards Per 10 Hour Day Oil Engines Important Factor in Economy of Operations

THE pumping plant of the Tennessee Arkansas Gravel Company is located seven miles down the Mississippi River from Arkansas City, Arkansas. The pump producing the sand and gravel is a 15-inch Ellis pump built by W. C. Ellis and Sons of Memphis, Tennessee. The pump is directly connected by means of a Hill friction cut-off coupling to a 180-H.P. Anderson four cylinder type K oil engine. The engine is operated at 257 R.P.M. All auxiliary units such as suction hoists, anchor hoists, anchor cables, drums, etc., are also operated by the Anderson oil engine by means of pulley and line shaft.

The pump has a capacity of 2,000 cubic yards per 10 hour day of mostly ballast material. The over-run of sand is returned to the river. The pump carries a vacuum of 28 pounds with 50 feet of suction pipe and 20 feet of discharge pipe and pumps against a total head of 30 feet.

All the screening of material is done as it is taken from the river and pumped into the barge by means of bar screens. This screening is accomplished with one handling. The screens are so arranged with "blinds" that the material can be left with the desired amount of sand.

The table hoist, extension shaft, outboard with thrust bearings, and the suction pipe were manufactured by W. C. Ellis and Sons.

The sand and gravel is loaded into barges at the dredge boat as it comes from the screens and towed by a tug boat to the unloading station at Arkansas City a distance of seven miles.

The Tug "Virginia," Now of Fireproof Construction.

Loading the Barges Down the River.

These barges each have a capacity of 200 cubic yards.

An American hoist mounted on a barge unloads the barges of sand and gravel and deposits the material into a storage bin on the river bank. This hoist is equipped with a 1½-yard Hayward clamshell bucket. The sand and gravel is drawn from the storage bin on the river bank and loaded into 10-yard side dump cars and drawn a distance of some 800 feet by an American cable hoist to the storage bins. The cars are tripped and dumped over the desired bin in the storage house. The unloading hoist and the cable hoist are both steam machines. Oil is used for fuel under the boilers. Later this will be converted to oil engine power by use of

A View of the Anderson Oil Engine.

an engine generator set from which all small units will be operated by motors.

The storage bins are built above three sets of track of the Missouri Pacific Railroad. The sand and gravel is dropped from hoppers directly into the cars. At the present time the Tennessee Arkansas Gravel Company is loading 1,200 cubic yards daily.

The tug boat used in hauling the barges to Arkansas City is equipped with a 180 H.P. three cylinder Anderson oil engine turning up a 46 inch propellor at 260 R.P.M. With two barges loaded with 200 cubic yards of material each the tug makes the trip of seven miles against the current in 2¼ to 2½ hours. The return trip with two empty barges is made in 45 minutes. The tug makes three round trips a day.

The storage tanks for the fuel oil are located on the bank of the river at the unloading plant and the oil is piped from storage to the fuel tank on the tug. One of the barges is equipped with a large oil storage tank which carries fuel oil to the pump barge down the river. The oil from this storage tank is unloaded to the barge fuel tank by means of air pressure from the Anderson oil engine. The oil from the barge storage tank is forced at about 15 pounds pressure to the fuel tank on the pump dredges.

Mr. C. C. Hawkins, president of the Tennessee Arkansas Gravel Company and actively in charge of operations, states that it costs no more to operate the oil engines than the previous cost in wages of the coal passers. The fuel oil cost on both engines averages about $8.00 per day.

The tug and dock were destroyed by fire recently. The hull, however, being of steel construction was not materially damaged. The oil engine on the tug was rebuilt and the tug itself rebuilt entirely of fireproof construction.

Mr. C. C. Hawkins is President, Mr. C. P. Stanley, Secretary and Mr. H. H. Scott, Treasurer of the company.

Power Show Features Lectures

The Third National Exposition of Power and Mechanical Engineering will feature a series of lectures on recent developments in important phases of power-plant and mechanical engineering practice. The Exposition will be held in the Grand Central Palace, New York, from December 1 to 6, inclusive, 1924.

Delegations of students and instructors from a large number of schools of mechanical engineering will be sent and lectures for the students are planned to be supplemented with visits to the various exhibits of power.

A Dredge Interior Showing Oil Engine.

Sand and Gravel Well Up

How 1924 Movements Compare with Last Year. Ninth Convention of the National Sand and Gravel Association

By Our Washington Correspondent

STATISTICS compiled by the Washington headquarters of the National Sand and Gravel Association show that production of sand and gravel this year is keeping pace with the record-breaking output of cement. T. K. Barrows, Executive Secretary of the National Association, states that movements at this time are about 20 per cent greater than in 1923 and the records show that each section of the country, with exception of some parts of the Southwest, is moving a greater quantity of materials this year.

Secretary Barrows also states that the car supply for sand and gravel has been ample this year, but few car shortage complaints being received by the Washington office. In each instance, he explains, these complaints were satisfactorily handled through the American Railway Association. However, complaints have been received from members in various parts of the country that carriers refused to furnish them with company cars, but confined their car supply to foreign cars moving in the direction of home lines. Such restrictions, Mr. Barrows says, are unjustified and without authority and that such complaints of that character coming to the Washington office have been taken up with the proper authorities and promptly adjusted.

There have been no reports of an actual shortage, though a few members have complained of some little difficulty in getting cars promptly. The Washington office does not consider these complaints of serious proportions, although the situation is being watched closely in order that interests of members may be protected. In August the reported open top car surplus was 162,343. The latest figures indicate that this surplus has been reduced to 111,254 cars. When cold weather sets in, this surplus will be taken up quickly by the movement of coal. Still there is no good and sufficient reason why sand, gravel and stone producers should not secure adequate transportation service for the rest of the year, it is held. The American Railway Association is not anticipating that there will be any transportation shortages this winter.

An active and personal interest of members is being manifested in the Ninth Annual Convention of the National Sand and Gravel Association to be held at the Auditorium Hotel in Chicago January 5, 6 and 7. President John Prince wishes it understood that this is to be a convention of the industry and that membership in the National Association is not required of those who wish to attend. Tentative plans call for registration of delegates on Monday morning, January 5, with a meeting of the Board of Directors Monday afternoon. The convention proper will convene Tuesday morning at 10 o'clock and will adjourn at 1 o'clock. On Wednesday the same hours will govern. On Tuesday night there will be a dinner-dance. The sessions as here tentatively outlined will permit ample time for group meetings, for visiting the Road Show, and for seeing the sights of one of the world's greatest and most interesting cities.

The proposed open meeting of the executive committee of the National Association, scheduled to be held at Terre Haute, Ind., has been indefinitely postponed owing to an unexpected conflict with the date of the annual meeting of the Indiana Sand and Gravel Producers' Association.

"Rol-Man" Manganese Chains

Two new bulletins have been issued by the Manganese Steel Forge Company of Philadelphia, featuring the "Rol-Man" Chains and "Rol-Man" Screens.

This company takes pride in its Flat Link Chains and Accessories made of "Rol-Man" Manganese Steel. These are all made of Rolled or Forged Manganese Steel Bars, Rods or Plates having the highest abrasive resistance of any steel made, and are said to be strong, accurate to pitch and true to size. They are designed to present the greatest wear resistance and lightest sections, consistent with the severe service to which they are subjected.

The features of the "Rol-Man" Lock Mesh Woven Manganese Steel Screens are described in the second bulletin as having the highest abrasive resistance of any steel made. They are designed to present the greatest wear resistance to sand, gravel, stone, slag, ores, coal coke and other highly abrasive materials.

Both bulletins are well illustrated and copies may be had on request.

All Cement Mills on Full Time

The Call for Business Construction Service is Strong This Month. The Labor Situation Remains Uniform.

By Our Special Correspondent

CONDITIONS at the cement mills in the Lehigh Valley district of Pennsylvania continue highly satisfactory. That the past months have been prosperous ones for the plants there can be no question, and the remaining months of the year are certainly causing no concern. Every mill is on the active list.

Incoming business has been good, and entirely sufficient to insure full production at the different plants. The call for building construction service has been particularly keen during the past few weeks, and the bulk of shipments has found its way to the larger distributing centers, as New York and Philadelphia, for this purpose. Supply dealers are placing sizable orders for immediate and early future deliveries.

Records of shipments for the month of September show exceptionally high distribution, equaling the average of the summer months. October, according to advance statements, is keeping along at the same pace, and every indication points to a record-breaking year for 1924.

There is practically no cement in storage at the present time and with a continuance of the present fine weather, it is doubtful if there will be any developments in this direction until well into the holiday season, despite the fact that leading producers have been seeking to lay by reserves for several weeks past.

The labor situation continues uniform, with full working quotas and a fair supply of available men for any emergency. Other lines of industry in this section, idle for several months past, are now starting up, and will likely draw operatives from these plants, although the cement mills are offering equally attractive wages as the iron, metal-working and other prominent industries hereabouts.

The railroads have been meeting the requirements of the cement producers in cars in almost every instance. Assurances have also been given by the carriers that sufficient freight cars will be available for the mills during the winter season ahead. Motor trucks, as usual, are handling their share of the distribution to good account, and will be kept in active fleet service as long as weather and road conditions permit.

The Atlas Portland Cement Co. is continuing under peak production at its large mills at Northampton, giving employment to the regular working force. The company is said to have heavy orders ahead. The Lehigh Portland Cement Co. is showing capacity operations at its different mills in this district, including the Ormrod, Fogelsville and West Coplay plants. A full working quota is being maintained in all departments. The Coplay Cement Mfg. Co., Coplay, is another active producing interest. The Penn-Allen Cement Co. and the Nazareth Cement Co., both with mills at Nazareth, are running on full turns with full working forces. The Dexter Portland Cement Co., also at Nazareth, is maintaining full activity, as are the Giant Portland Cement Co. and the Hercules Portland Cement Co., with plants at Egypt and Hercules, respectively.

The Crescent Portland Cement Co., Wampum, Pa., with a mill at Crescentdale, Pa., is purchasing property in the vicinity of Park Gate and Belton, Ellwood City district, Pa., and expects to accumulate a total of 1,000 acres for a new mill.

The National Cement Co., Ragland, Ala., is proceeding with the rebuilding of the portion of its local plant destroyed by fire a number of weeks ago with loss in excess of $750,000.

The Sloss Co., Birmingham, Ala., is completing the construction of a new cement plant, costing about $60,000, designed to produce concrete aggregates, and will place the works in service at an early date. The new plant will utilize the slag from the furnaces of the Sloss-Sheffield Iron & Steel Co., mixing in right proportions for the concrete, delivering liquid concrete on order, ready for the job. This is an entirely new branch of production in the cement industry in this section and is expected to be very successful.

The Hermitage Portland Cement Co., Nashville, Tenn., is maintaining full operations at its local mill, with daily output of about 2,200 barrels. The Signal Mountain Portland Cement Co., Chattanooga, Tenn., with mill about five miles from the city, is running on a full capacity basis, with present shipments averaging 5,000 barrels per day, or practically the entire plant output, in addition

to drawing upon the reserves, accumulated during the early part of the year, when the plant was developing initial operations.

The California Portland Cement Co., Colton, Cal., has begun work on a new stockhouse at its local mill, estimated to cost about $200,000.

Brisk and Fair at Pittsburgh

Business Satisfactory and Orders Coming In. Boat Construction and Repair Yard Activities Reported.

By Our Pittsburgh, Pa., Correspondent

A GOOD rate of activity is being maintained by the sand and gravel producers in the Pittsburgh district, and fine weather conditions are assisting materially both production and distribution. This advantage is not being neglected by the leading operators, and there has been a greater accumulation of stocks in recent weeks for the winter season. Sand diggers are being pushed to capacity in the different established pools on the rivers, keeping the barges busy in hauling the material to the local port and other nearby destinations.

Present business is quite satisfactory, with advance orders coming along at a rate to indicate a continuance of operations well into the winter period. There is a firm call for material from construction interests, with a number of the mills along the river front absorbing good quantities of stock. The entire market tone is one of firmness and stability.

Boat construction and repair yards show no let-up in operations, and a number of producers in the Pittsburgh and neighboring districts have placed orders for new dredgeboats and barges. The Dravo Contracting Co. is particularly active in this line, and has recently launched a large sand and gravel dredger at its Neville Island shipyards for the Ohio River Sand Co., Louisville, Ky.

In connection with tow boat construction, it is expected that there will soon be a distinct departure in type of vessel for sand and gravel service. It is reported that several of the larger local companies are planning to use motor power boats, ranging from 200 to 600 H.P. in capacity, and will place orders for such equipment at an early date.

The price situation continues uniform, with little to report in this connection. Good washed gravel is selling at $1.10 a ton, wholesale quantities, at producers' docks. Best river sand continues to be quoted at $1.25 a ton at company landings to contractors and dealers. At the diggers, a price of $1.00 a ton prevails. Crushed stone shows no variation in the $2.85 per cubic yard rate, current for some time past, both sizes, 1½ and ¾-in. Portland cement is at $2.19 per barrel in the local wholesale market, less bags.

There is marked development in the upper Allegheny River and a number of sand and gravel companies have been formed to operate in this section. The material is secured through a drag-line method, as this portion of the river is not as yet improved, making boat and barge navigation impossible. One plant is now being operated near the mouth of East Sandy Creek, near Franklin, while other large works are situated near Warren and at Tionesta, respectively. A particularly fine grade of material is being secured, the majority of the output finding its way into state road construction.

Northwest Agencies

Announcement is made by the Northwest Engineering Company of Chicago that arrangements have been made with the Beckwith Machinery Company, 500 Arch St., Pittsburgh, to handle Northwest equipment.

Changes have also been made in the Pacific coast territory, and Northwest will be handled in the Los Angeles district by the Collins-Kay Company. The Northwest's own office has been established in San Francisco at 23 Main St., in charge of W. W. Mutter.

I L G Condensed Catalog

In a 48-page pocket size book the I L G Electric Ventilating Company of Chicago describes in condensed form the line of I L G Products, with photographs and specifications of I L G Self-Cooled Motor Propeller Fans, Universal Blowers, Automatic Shutters, and Ilgair Unit Heaters.

Ilgair products are made, tested, sold, and guaranteed as a complete unit. The I L G Electric Ventilating Company takes full responsibility for the design of complete fan and motor. Each outfit is tested in the I L G plant on the actual circuit on which it will be run. Full descriptions and price lists are given.

How the East Stacks Up

Aggregate Contracts in New York, $7,000,000 to $10,000,000 Weekly. The Call in Jersey, Long Island, Boston.

By Our Eastern Correspondent

PRODUCTION and distribution of sand, gravel and crushed stone at New York and neighboring districts are maintaining well, considering that this is presidential year. Producers are making the most of the good weather, and in the Long Island and New Jersey sections there is considerable activity, both in output and shipments.

Construction operations are moving forward. There is a good volume of work ahead and it is likely to be a winter of more than normal activity in certain lines of building, such as industrial, commercial and educational structures. School and college work, particularly, is taking on a broad aspect, and large quantities of material will be absorbed in structures of this character during the months to come. Aggregate contracts in the New York district are now running from $7,000,000 to $10,000,000 weekly, with contemplated projects, or those on the architects' boards, totaling about twice this sum. These figures show an appreciable advance over those of a month ago.

There is plenty of labor in the New York territory. It is currently estimated that in the different lines of trade there are from 150,000 to 175,000 skilled workers now idle, many of these in the construction industries. With this condition, it is expected that bonus systems will come to an end in the very near future and that labor costs will become generally stabilized. Practically all branches of the trade are working without any differences with employers, and disturbances are becoming a thing of the past.

Sand, gravel and crushed stone are among the firm factors in the material market at New York. With related basic materials, such as cement, lime, etc., there is rather a stiffening in quotations, and present price schedules are being well maintained. The trend, if anything, is upwards.

Operating under good demand, best washed gravel holds at $1.75 per cubic yard, both 1½ and ¾-in. sizes, in the wholesale market. Sizable quantities of material are being received from the producing centers, with supply yards developing a good account for immediate requirements. Retail, a price of $2.75 holds for material delivered on the job, in Brooklyn, Bronx and Manhattan Boroughs.

There is an active call, also, for good washed sand, and local material from the Cow Bay and other districts is moving quite satisfactorily. A wholesale level of $1.00 a cubic yard prevails, wholesale, cargo shipments, while the building material dealers are asking $2.00 to $2.15 for stocks delivered on the job in established zones.

Crushed stone prices show no tendency to change and demand is holding up fairly well. Distribution for road-building account is growing noticeably less, as may be expected at this season of the year. For 1½-in. material, a level of $1.75 a cubic yard in carload lots is current, with smaller size stocks, ¾-in., being priced at $1.85, wholesale. In the retail market, a flat schedule of $3.00, delivered to destination, is prevailing, both sizes.

There is a growing tendency on the part of contracting interests to purchase "aggregates," or a mixture in desired proportion of sand and gravel, for current construction operations. Thus, considerable material in the local market is leaving the dealers' yards ready for use on the job, with the prevailing level about the same as that for plain gravel.

The heavy production figures for sand and gravel in New Jersey during the last year, as shown by compilations recently completed by the State Department of Conservation and Development, bid fair to be duplicated with 1924 outputs, which are now maintaining exceptionally good averages for this period of the year. Producers in the Raritan River section report incoming business as quite satisfactory. During the year past, the aggregate New Jersey output reached 6,101,204 short tons of sand and gravel, valued at $4,381,855, an increase of 1,246,771 short tons over the preceding twelve months and a corresponding advance of $956,842 in valuation. The largest output of each material was for construction purposes, the figures standing at 2,755,848 short tons of sand, and 1,366,212 short tons of gravel, for such service, valued at $1,277,983 and $1,065,264, respectively.

New Company Formed

The National Engineering & Equipment Company of Anderson, Indiana, has been incorporated by W. N. Durbin, former president, and R. I. Van Winkle, former secretary, of the Anderson Foundry & Machine Co., associated with Jos. E. Hennings and Linfield Meyers, Anderson bankers. Mr. Durbin was an official of the Anderson Foundry and Machine Co. for 35 years, manufacturing saw mill, brick and clay machinery, tin plate machinery and Anderson Oil Engines, and has a wide acquaintance.

The new company will specialize in power equipment and kindred lines, with especial regard to plant design and construction; also equipment for brick and clay working plants, crushing and pumping plants for the stone, sand and gravel industries.

Dryssen Joins Blaw-Knox

Announcement is made by the Blaw-Knox Company of Pittsburgh, Pa., of the appointment of Waldemar Dyrssen as Chief Engineer, Furnace Department and Chief Engineer Forge and Hammer Welding Department of the Company. Mr. Dyrssen, who is a graduate of the Royal Technical University, Stockholm, Sweden, degree of Metallurgical Engineer, 1908, has had wide and comprehensive experience in the steel industry.

Mr. Dyrssen was formerly Designing Engineer in the Department of Construction for Les Petits Fils de Francois de Wendel et Cie, in Lorraine; later with the Uddeholm Company, Sweden, as Blast Furnace and Open Hearth Superintendent; and Designing Engineer, Department of Construction, the Bethlehem Steel Company, Bethlehem, Pa. Since 1915, he has been with the United States Steel Corporation as metallurgical Engineer. In the latter position he helped in the development of the Hercult Electric Furnace under the late W. R. Walker and J. H. Gray.

Boston Gears

In their new *Catalog No.* 45 for 1924 the Boston Gear Works of Norfolk Downs, Quincy, Mass., has this to say of its products:

"During the various stages of manufacture Boston Gears are rigidly inspected to maintain uniformity of product, and all are guaranteed as to material and workmanship."

This little book contains 192 pages

Electric Monorail Hoist

An electric hoist of the monorail type has been developed by the American Engineering Company, of Philadelphia, in half-ton and one-ton sizes, designed to operate in a minimum head room. This hoist is smaller and lighter than the rest of the American "Lo-Hed" family of hoists, but retains their distinguishing features.

The ability to draw up a load until it almost touches the rail is the big feature of the hoist, making it available in places where other hoists could not operate because of the low headroom. It gives additional clearance and safety for bulky loads and makes high piling possible. It is furnished for either direct or alternating current, and all working parts are accessible.

A safety device checks the hoist and throws off the current when the upper limit of travel is reached, and automatic holding and lowering brakes are provided. High duty roller bearings and automatic lubrication give an efficiency of 80 per cent, and overloads are possible in emergency.

Southern Iron & Equipment Co.

A new catalog on Rebuilt Railway, Logging, Contractors' and Industrial Equipment has been issued by the Southern Iron & Equipment Company at Atlanta, Ga., dated October, 1924.

The equipment listed includes Standard Gauge Locomotives of many types: Prairie Type, Mogul Type, Ten-Wheel Type, Consolidation Type, Atlantic Type, Saddle Tank Type, Switcher Type, Geared Type; also Locomotive Cranes, Steam Shovels, Flat Cars, Gondola Cars, Dump Cars, Coaches, Combination Cars, Relaying Rails, and Narrow Gauge Equipment, Locomotives, etc.

The list shows only a portion of their stock, all of which is actually on hand, ready for shipment.

The Gray Tractor Company Changes Hands

The Gray Tractor Company of Minneapolis, Minn., has been purchased by the Waukesha Motor Company of Waukesha, Wis., and W. S. Dwinnell of Minneapolis. The sale was consummated late this fall, but the business is again operating. It will continue to manufacture and sell the Gray Tractor and the Gray Giant Road Maintainers, and will operate under the old name.

The Ganschow Speed Transformer

By William Ganschow*

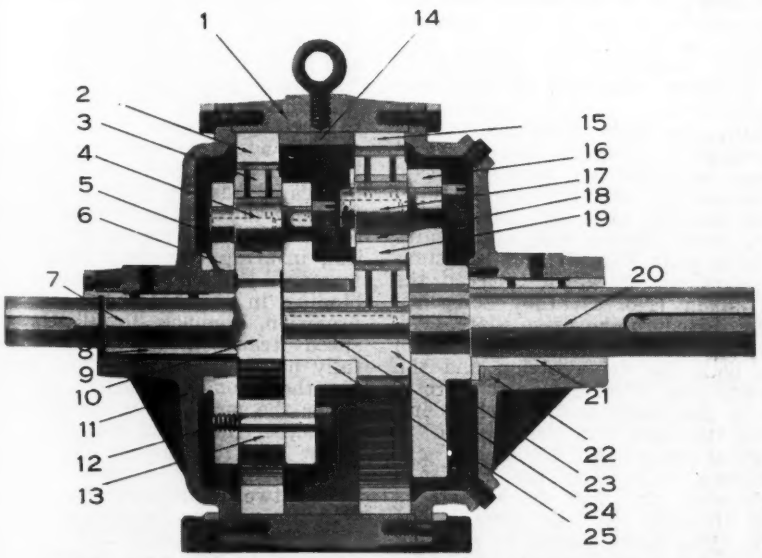
THE conditions which the processes of sand, gravel, stone, lime, gypsum, and cement manufacturing imposes upon speed reduction equipment are very severe, not only because of the abrasive character of the material handled, but also because of the varying conditions of moisture, heat and load. In addition, trouble is often encountered because the viscous materials stick to belts and make it impossible to keep friction surfaces clean.

While the Ganschow speed transformer is an especially efficient compact unit for the transmission of power and the reduction of speed, it is further a unit which may be installed under operating conditions that would render other types of speed reduction equipment highly inefficient if not wholly impracticable. It is because of this ability to function properly under the most adverse conditions that it is particularly applicable to the sand, gravel, stone, lime, gypsum, and cement industries. Being entirely enclosed and self-contained, it is impervious to abrasive dust, moisture, and relatively high temperature, and consequently requires no attention except occasional lubrication, and its maintenance cost is negligible.

In the past several years, the trend toward modern conveying and materials handling equipment in sand, gravel, stone, lime, gypsum, and cement plants has opened a wide field for speed transformers in the driving of materials handling units. It is often necessary that the conveyor drive-heads be placed in locations that are not easily accessible or where they are constantly subjected to the wearing action of abrasive materials. In such places, some types of enclosed drive are the only guarantee of freedom from the constant replacement of parts. Speed transformers are rapidly becoming the standard drive for this type of equipment.

On conveyors, tube mills, rotary kilns, bucket elevators, crushing and grinding equipment, etc., speed transformers find an ideal application, for they are not only capable of very high reduction which makes them particularly adaptable to slow-moving machinery, but their planetary construction absorbs the shocks that are

*President—William Ganschow Company.



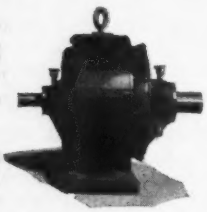
Cut-away Illustration of Type "A" Showing Parts as Described Herewith.

caused by the reciprocating action in crushers and uneven material distribution in other machines.

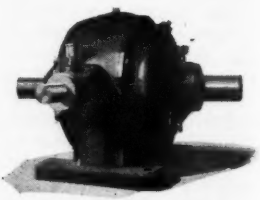
There is not a common machine used in the non-metallic industry which cannot be efficiently driven with a planetary speed transformer.

Ganschow speed transformers have come to be standard equipment with the manufacturers of special machinery for the sand, gravel, stone, lime, gypsum and cement industries and are built-in as integral parts of many machines.

Ganschow speed transformers are furnished in any capacity from ¼ to 150 H. P. and in any ratio over a



Type "A" Direct Drive.



Type "B" Angle Drive.

wide range up to 250-to-1. They are easily installed and require only a firm foundation and reasonable care in the alignment of motor and machine through flexible couplings.

The principle upon which Ganschow speed transformers operate is the planetary gear arrangement and each unit consists of one or more gear assemblies or "reduction stages," each in turn, imparting its reduction to the adjacent stage or to the slow speed shaft.

Thus, the high speed shaft (No. 7), which is integral with the first drive pinion (No. 10), revolves within and is amply supported by the high speed bearing (No. 8). This high speed pinion meshes with and rotates the idler gear (No. 3) and two similar gears, all of which turn on the idler studs (No. 4), they being securely bolted to the drive plate (No. 25). The idler gears, which mesh with both the drive pinion and the internal gear (No. 2) cause a rotation in the whole unit, which is imparted through the drive plate to the drive pinion (No. 23) of the next "reduction stage." In the case of a single unit, the first drive plate is keyed directly to the slow speed shaft. The drive pinion is securely keyed to the drive plate (No. 25), and, because of its exceptionally long bearing, forms an ample support between the two stages.

There are several basic advantages in this type of construction: 1. Very large reduction in a comparatively small space. 2. Because of the internal gear arrangement, more teeth are constantly in mesh and can therefore transmit more power for a given tooth area. 3. The whole interior driving mechanism revolves concentric with the main shaft, and the inertia of the parts, all of which rotate in the same direction, has a large influence in securing silent and vibrationless operation.

One of the outstanding features of Ganschow design is that overhanging load has been reduced to a minimum, due to extra long bearings between the "reduction stages" and the adequate support of the mechanism which is affected by the centralizing bearing.

The second drive pinion (No. 23) has a long and well lubricated bearing on the low speed shaft (No. 20) and is, in turn, securely keyed to the first drive plate (No. 25). The centralizing bearing (No. 6) is rigidly supported by three drive studs (No. 4) and by three spacer collars (No. 13), and it in turn, has a large well lubricated bearing upon the inside of the hub thus giving perfect support to the whole interior rotating mechanism, insuring Ganschow speed transformers against misalignment and binding in the bearings, It is this provision, common to all Ganschow speed transformers and which is fully patented, which partly accounts for their long period of usefulness under the most adverse conditions.

Another important feature of Ganschow construction is the positive lubrication and the large oil reservoir.

The two main bearings are oiled from cups in the housing, so designed as to insure a continuous supply of clean oil to the main journals.

Each bearing of the rotating

mechanism is lubricated through the hollow shafts or drive studs and by oil holes in the pinions. In this manner the rapidly moving parts are continually flooded with oil from the hollow shafts, due to the centrifugal force set up by their rotation.

Ganschow speed transformers are made in three types, namely, direct drive, angle drive, and vertical drive. The principles of design and operation are very similar, being modified only to accommodate the different driving conditions.

Ganschow speed transformers are standard in every way and are made in sizes from 1 to 150 H. P., and with reduction ratios of 4-to-1 to 250-to-1, thereby covering every possible application for speed transformer units with a standard transformer of tested design.

The direct drive, or Type "A", may be applied in machinery with horizontal drive shafts and is connected concentric with the drive shaft by means of a flexible coupling. This type is very popular for conveyor drives, grinders, crushers, and all sorts of process machinery.

The angle drive, or Type "B", is arranged so that the motor may be placed at right angles to the driven shaft of the machine. Where space is a factor, this type of drive very often may be used where there is not sufficient room for a direct connected unit. It is also particularly applicable to line shaft drive, as it may be arranged for two driven shafts at the same or different speeds, the motor being at right angles with both driven shafts.

The vertical drive, or Type "C", may be used to drive any machinery with vertical shafts, such as mixers, feeders, agitators, or centrifugals. It is easily applied and has the advantage of allowing the motor to be placed at sufficient distance from the speed transformer to escape the effects of steam, acid gas, or abrasive dust, which may arise from the process and which are injurious to other types of speed reduction, as well as to electric motors.

Type "C" Vertical Drive.

Detroit Hoists

Two new catalogs have recently been issued by the Detroit Hoist and Machine Co. of Detroit, Mich. One, Catalog 23P, is on *Pneumatic Hoists*, and the other, Catalog 23E, is on *Electric Hoists*.

The many labor-saving applications of the equipment devised by the manufacturers are described as being the result of their twenty years' experience in a diversified field covering manufacturing plants of every description, such as warehouses, storage plants, mines, excavations, tunnels, etc. There are few conditions in modern industry which do not require hoisting appliances of some kind. "Detroit" hoists are said to be the embodiment of extensive experience and comprise an unusually simple, accessible, reliable and durable machine.

Catalog 23P, Pneumatic Hoists, briefly shows many designs and applications of Pneumatic Hoists, Motors, Cranes, Winches, etc. *Catalog 23E*, Electric Hoists, describes many standard designs and various special applications of Hoists, Monorails, Cranes and Winches.

The Neal Company Purchases More Gravel Plants

The Neal Gravel Company has announced the purchase of the plants of the Carmichael Gravel Company located at Attica and Wolcottville, Ind.

As a result of this deal the Neal Gravel Company now has seven well situated plants, as follows:

Attica, Indiana (two plants) Wabash R. R.
Covington, Indiana, Big Four R. R.
Silverwood, Indiana, Clover Leaf, R. R.
Summit Grove, Indiana, C. & E. I. R. R.
Wolcottville, Indiana, Wabash, R. R.
Palestine, Illinois, I. C. R. R.

The combined annual out-put of the plants of this firm will exceed 20,000 cars or over 1,000,000 tons. They are prepared to serve a large market territory covering a good part of Illinois and Indiana.

Ross Power Equipment

The Ross Power Equipment Co., of Indianapolis, Ind., issues from time to time a card list of equipment such as grinding wheels, oil engines of many types, Locomotive Cranes, Water Wheel Sets, Dryers, Draglines, Pulverizers, Turbines, Heaters, Boiler Feed Pumps, Steam and Electric Hoists, Steam and Belt Driven Air Compressors, Water Tube and H R T Boilers, Condensers, Mixed Press, Steam Turbos, Trenching Machines, Jaw Crushers, Corliss Engines, and Miscellaneous Equipment.

At present this company has available for quick shipment some very large roll gyratory and jaw crushers with screens, elevators, and other quarry apparatus.

An Insley Installation

An Insley Excavator with shovel attachment is being used by Wood County, West Virginia, to handle material from a gravel bank for use in surfacing gravel roads. This work is being done by the County, under the supervision of Mr. William Shaver, County Road supervisor.

It was found that the shovel will load three to four yards of material on a truck in from a minute and a half to two minutes. Each truck averages fifteen trips per day.

When not being used in handling gravel, this machine is used to clean up hillside slips. As the machine is easily moved, a wide territory can be covered on work of this nature.

Zelnicker's Latest Folder

Bulletin No. 329, just issued by Walter A. Zelnicker Supply Co., St. Louis, Mo., describes briefly the stock on hand of Locomotives, Shovels and Cranes, Car Rails, Switch Material, Track Accessories, Steel Piling, Pile Driving Hammers, Pipe and Tanks, Hoisting Engines, Power Plant and Contractors' Machinery, Tank Car Tanks, and every kind of equipment.

Waugh Stopers Bulletin

Bulletin No. 70 A, describing 773 Series, Waugh Stopers, Models 773, 773 W, 774 and 774 W, has just been issued by the Denver Rock Drill Manufacturing Company, of Denver, Colo.

The 773 Series are the latest models of hand rotated drills, designed for fast drilling and the simplified construction reduces upkeep cost. The four models are as follows:

Model 773 is the direct air feed dry stoper.

Model 773 W is the direct air feed wet stoper.

Model 774 is the reverse air feed dry stoper.

Model 774 W is the reverse air feed wet stoper.

Illustrations show the Model 773 W in operation, and Sectional Views show the details of construction. Waugh Sinkers, Drifting Drills, Line Oilers, Steel Sharpeners, Steel Punchers, and the Waugh Comparascope are also illustrated and described.

The Insley with Shovel Attachment.

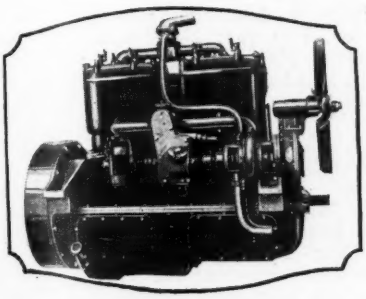
Getting the BEST out of Machines and Men

—Most **Manufacturers** of contractors' machinery prefer Climax The "Trustworthy" Engine, because it gets the most out of their **machines.**

—Most **Contractors** prefer it because it sets a pace that just naturally gets the most out of **every man** that works with it and around it.

—Most **Workmen** prefer it because of the spirit with which it tackles every job.

No excitement—no fuss—no stalling. Quickly—quietly—smoothly it goes to work and stays on the job 'till the last man's work is done.



CLIMAX ENGINEERING CO.
13 W. 18th Ave., Clinton, Iowa

Makers of

CLIMAX

The "Trustworthy" Engine

Climax "Trustworthy" Engines are used as Standard Equipment by—

Bay City Dredge Works, Bay City, Mich.
Byers Machine Co., Ravenna, Ohio
Equitable Asphalt Maintenance Co., Kansas City, Mo.
Fairbanks Steam Shovel Co., Marion, Ohio
Fate-Root-Heath Co., Plymouth, Ohio.
Greiman Ditcher Co., Inc., Garner, Iowa.
J. T. Tractor Co., Cleveland, Ohio
Keystone Driller Co., Beaver Falls, Pa.
Link-Belt Co., Chicago, Ill.
Locomotive Crane Co. of America, Champaign, Ill.
McMyler-Interstate Co., Cleveland, Ohio
Mundle Manufacturing Co., Peru, Ill.
Northwest Engineering Co., Green Bay, Wis.
Orton & Steinbrenner Co., Huntington, Ind.
Parsons Co., Newton, Iowa.
Rix Compressed Air & Drill Co., San Francisco, Calif.
Russell Co., Massillon, Ohio
Vulcan Iron Works, Wilkes-Barre, Pa.
Geo. D. Whitcomb Co., Rochelle, Ill.
W. T. Young Engine Co., Oil City, Pa., and many others.

Sales and Service Stations in the following cities:

Atlanta, Ga.
Birmingham, Ala.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Dallas, Texas
Denver, Colo.
El Paso, Texas
Houston, Texas
Indianapolis, Ind.
Jackson, Miss.
Jacksonville, Fla.
Kansas City, Mo.
Little Rock, Ark.
Los Angeles, Calif.
Louisville, Ky.
Minneapolis, Minn.
Nashville, Tenn.
New Orleans, La.
New York, N. Y.
Oklahoma City, Okla.
Omaha, Nebr.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
St. Louis, Mo.
San Francisco, Cal.
Seattle, Wash.
Tampa, Fla.

Orton & Steinbrenner "Dependable" 7-ton Crawler Shovel equipped with Climax "Trustworthy" Engine

Unearthing Buried Treasure

The Godfrey Conveyor Company of Elkhart, Indiana, has issued a bulletin entitled, "Unearthing Buried Treasure with a Godfrey." This bulletin presents concrete examples of what the Godfrey Drag Scraper Outfit will do under actual conditions as they exist in the average pit.

The Godfrey Portable and Godfrey Monorail conveyors are also described and illustrated.

Haiss Fordson Tractor

A new machine has been brought out by the George Haiss Mfg. Co., Inc., of New York, called the Haiss Fordson Tractor. As the name indicates, the Fordson Tractor is used. By dismounting the four wheels the Haiss caterpillar tractor links are installed, which, they say, gives the machine better ability to go over uneven ground and to pull greater loads.

The general dimensions of the Haiss Tractor are: length over all, 8 ft.; width over all, 6 ft.; height over all, 4 ft. 10 in.; length of track ground, 4 ft. 6 in.; ground clearance, 12 in.; tread of track, 5 ft. 10 in.; weight, about 4,000 lbs. It has three forward speeds and one reverse, and capacity of 15 drawbar H. P. The machine is steered by brakes adjacent to sprockets on jack shaft differential, which is enclosed. The track is of Haiss' exclusive design, the track links having heavy double rail cast integral with track shoe. There are three truck rollers on either side, of cast steel, extra heavy; the truck roller frames are of heavy steel angles and channels with roof. The Haiss Tractor is built of 7-in. channels connected by three cross braces.

Austin Moves Offices

The Austin Machinery Corporation announces the removal of the general offices from 3500 Door St., Toledo Ohio, to 1075 Lake Shore Drive, Muskegon, Michigan. The officers of the corporation are now as follows:

O. A. Seyferth, Vice-President and General Manager.

N. D. Farmer, Treasurer.

Charles Bradrick, Secretary.

G. S. Pierson, Sales Manager.

George T. Rosselle, General Superintendent.

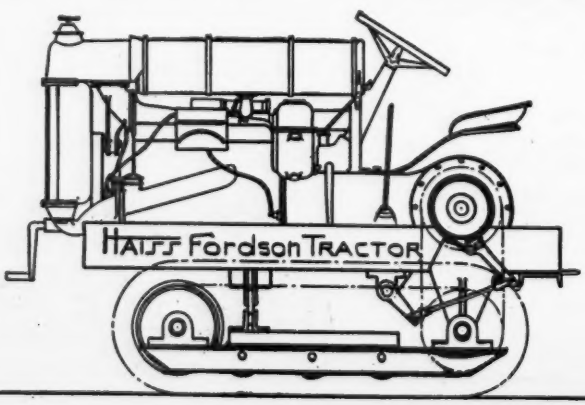
V. G. Halby, Chief Engineer.

G. T. Stuart, Advertising Manager.

Orders for repair parts for all Austin Machines should be directed to the Muskegon Plant.

New Traylor Bulletin

Bulletin No. 109, profusely illustrated, has just been issued by the Traylor Engineering & Manufacturing Co., of Allentown, Pa., completely describing their Bulldog Finishing Crusher.

This bulletin is of particular interest to the sand and gravel industry, because it deals effectively with the hard "nigger heads" which in the past have been discarded by operators. The Bulldog Finishing Crusher is designed to withstand the terrific strains to which a breaker is subjected.

The Bulldog has the same features that the larger type has, such as the Hewes rigid bar type spider; positive force feed lubrication; a split and tapered head nut which eliminates thread stripping; and a dust seal. The concaves are also assured maximum life because six separate and distinct settings can be made without dismantling the crushers and without the use of zinc or heavy lifts.